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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

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For related information see also *34 Fluid Mechanics and Heat Transfer*.

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Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

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For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS 1230
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE 1231
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION N.A.
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) 1231

89 ASTRONOMY 1244
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 1255
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 1258
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 1259
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 1260
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL 1261

Note: N.A. means that no abstracts were assigned to this category for this issue.

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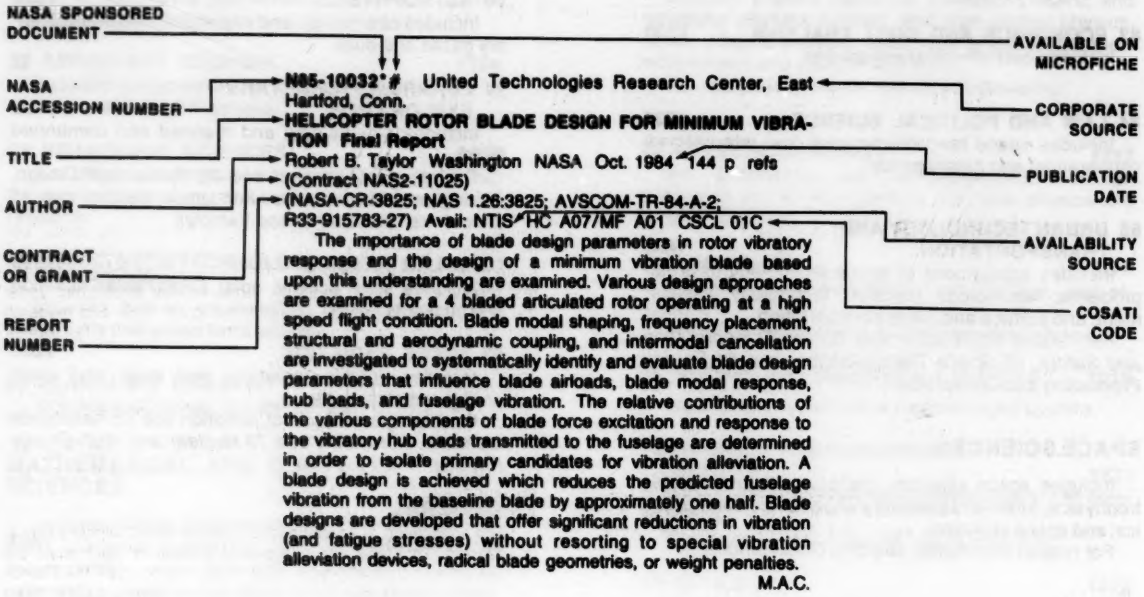
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N85-10032*# United Technologies Research Center, East Hartford, Conn.
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HELICOPTER ROTOR BLADE DESIGN FOR MINIMUM VIBRATION Final Report
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The importance of blade design parameters in rotor vibratory response and the design of a minimum vibration blade based upon this understanding are examined. Various design approaches are examined for a 4 bladed articulated rotor operating at a high speed flight condition. Blade modal shaping, frequency placement, structural and aerodynamic coupling, and intermodal cancellation are investigated to systematically identify and evaluate blade design parameters that influence blade airloads, blade modal response, hub loads, and fuselage vibration. The relative contributions of the various components of blade force excitation and response to the vibratory hub loads transmitted to the fuselage are determined in order to isolate primary candidates for vibration alleviation. A blade design is achieved which reduces the predicted fuselage vibration from the baseline blade by approximately one half. Blade designs are developed that offer significant reductions in vibration (and fatigue stresses) without resorting to special vibration alleviation devices, radical blade geometries, or weight penalties.
M.A.C.

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Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N85-16731# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
DESIGN FOR TACTICAL AVIONICS MAINTAINABILITY
Loughton, England Oct. 1984 281 p refs In ENGLISH and FRENCH Conf. held in Brussels, 7-10 May 1984
(AGARD-CP-361; ISBN-92-835-0366-10) Avail: NTIS HC A13/MF A01

Advanced methods and tools to support design for avionic maintainability and testability are discussed. Both hardware and software design for maintainability issues and approaches are addressed. For individual titles, see N85-16732 through N85-16756.

N85-16732# Breguet-Aviation, Saint Cloud (France).
OBJECTIVES IN STUDYING THE MAINTAINABILITY OF AIRCRAFT SYSTEMS [OBJECTIFS D'ETUDE DE LA MAINTENABILITE DES SYSTEMES AVIONNES]
M. Courtois *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 10 p refs In FRENCH (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

Increased use of electronic equipment in combat aircraft results in an increased cost of avionics and of the total purchase price of aircraft. The maintenance of more numerous, more complex, and more costly electronic systems involves maintenance methods which are themselves both numerous and complex. Given the very important acquisition costs of future systems (supplies and replacements will be limited), the maintenance of electronic systems will be an essential function in assuring the maximum operational availability of aircraft. System costs must be reduced to allow for troubleshooting and the verification of aircraft equipment. Different levels of maintenance are analyzed using solutions developed for the Mirage aircraft. Specifications for the maintainability of all equipment, at all levels of maintenance must be established as a function of system architecture and the tests to be conducted. These specifications must be considered from the beginning of prototype equipment study. Transl. by A.R.H.

N85-16733# Naval Surface Weapons Center, Dahlgren, Va.
JOINT SERVICE DESIGN FOR TESTABILITY PROGRAM c33
W. L. Keiner *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 5 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

As electronics become more complex and more critical to weapon system operation, there is an acknowledge that new designs must be somehow constrained to be more easily tested or they may become completely unsupportable. As a result, design for testability is becoming increasingly important to the services. The Joint Logistics Commanders (JLC) Panel on Automatic Testing established a comprehensive program to coordinate the development of testing technology and its management within the military services. One important part of the program deals with the design aspects of the prime equipment which permit weapon systems to be more easily and confidently tested using automatic test resources. A JLC Testability Subpanel was established under the JPLC Panel to provide acquisition support tools and research and development programs in design for testability (DFT). Author

N85-16734# STTE, Paris (France).
THE EMBEDDED TEST (BIT): IMPACT ON THE TOTAL COST OF POSSESSION [TEST INTEGRE (BIT): IMPACT SUR LE COUT GLOBAL DE POSSESSION]
Ieta M. Kervella *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 4 p refs In FRENCH (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

The application of an embedded (built-in) test to digital systems is analyzed. Technical and operational aspects of such tests are discusserd and their characteristics as experienced by the French Air Force, are described. The total cost of having built-in tests comprises development, purchase, and operational costs. Results show that the cost of acquiring an embedded test is lightly increased, but is sharply diminished with respect to the cost of acquiring the on-line test formerly used. The cost of using the test should be likewise lower. By taking into consideration the observed operational results, the choice of the embedded test is shown to be satisfactory with respect to service rendered and cost. Transl. by A.R.H.

N85-16735# Aeritalia S.p.A., Torino (Italy).
STUDY AND REALISATION OF A 3RD LEVEL MAINTENANCE CENTER BASED ON ATE SYSTEMS UTILIZATION
Furio Bozzola *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 7 p (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

The development of the actual working program for the realisation of a 3rd level maintenance center for the avionics electronics modules of the MRCA Tornado aircraft is discussed. Starting from the initial requirement and from the primary goals of the program, and going through the different study and data collection phases, the adopted general criteria for the definition of the technical characteristics and quantities of the automatic test equipment to be used are described taking into account the testability problems shown by the different electronic boards to be maintained; problems connected with the boards available documentation are also measured. All the problems related to the management, installation, programming, interfacing, expandability and flexibility of the adopted automatic test equipment are discussed. In addition, using the actual maintenance problems faced during the activity development as a starting point, some general maintainability criteria that can be taken into account for similar future programs are outlined. Author

N85-16736# Ferranti Ltd., Edinburgh (Scotland). Product Support Dept.
A PRACTICAL EXAMPLE OF REDUCING LIFE CYCLE COSTS AND INCREASED AVAILABILITY c38

R. P. F. Lauder *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 11 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

The principles underlying effective operational availability are explored and quantified. It is shown that although large sums of money are expended on producing reliable components, these are vitiated if the end equipment is not exposed to a reliability growth program, because only 10% of the calculated mean time between failures (MTBF) will be realised in practice. It is claimed that costs can be reduced by using common commercial components without loss of MTBF provided it is followed by a reliability growth program. A practical example is given of the expensive and time consuming steps which have to be taken in resucing a low MTBF radar, and increasing its availability. The steps and the methodology leading to them are described and the results shown. M.G.

N85-16737# STTE, Paris (France).
ATE USER'S VIEW ON DESIGN FOR MAINTAINABILITY
Jose M. G. B. Mascarenhas *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 16 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

The main features of the Automatic Test Equipment (ATE) that PoAF is using are described. The hardware and software capabilities and limitations are emphasized. Techniques available for test program generation and validation are examined. Views on board design for maintainability (particularly with TE) are presented. B.W.

N85-16738# Dowty Electronics Ltd., London (England). Controls Div.
EXPERIENCE OF ONE UK ELECTRONIC EQUIPMENT SUPPLIER WITH BITE ON ENGINE/FLIGHT CONTROL SYSTEMS OVER THE PAST TEN YEARS c33
Raymond deGaye *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 18 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

Early analogue electronic controllers for gas turbine control and A/C flight control applications were complex and poorly understood by A/C maintenance personnel - they were relatively easy to remove from their installation compared with the surrounding hydro-mechanical components. Both of these factors led to high unconfirmed defect rates, since these electronic black boxes were usually the first to be blamed for system problems. There was a clear need for some kind of built in fault identification system. The history of Dowty electronics involvement in BITE over the last ten years is traced. The techniques used, successes and failures, and customer reactions are described. A range of civil and military, analogue and digital applications are discussed and four civil applications described in detail. B.W.

N85-16739# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
BUILT-IN-TEST FOR FIRST LINE TESTING
W.R.H. Behm *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 7 p (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

Built-In-Test requirements were established more than a decade ago to give the maintenance personnel at flight line a help for diagnosis tasks. The prospect of new technology offered automatic, quick, accurate, effective and easy interpretable GO/NOGO information of Line Replaceable Units with built-in self test (BIT) facilities. Typical design goals were: (1) Detection and location of defects down to LRU level with 80% probability and a 90% confidence level at minimum time, and (2) Defective LRUs shall automatically be identified on a Central Maintenance Panel. Whereas the general line of requirements were followed through, some problems occured, which influenced the final results. These problems are briefly: (1) false alarm probability is higher than was expected; (2) BIT capabilities are less than specified; and (3) BIT is not totally independent of operators interpretation. On the basis of experience gathered during the development of BIT these problems and their reasons were analyzed. B.W.

N85-16740# National Aerospace Lab., Amsterdam (Netherlands).
FUNCTIONAL BUILT-IN-TEST IN A PIPELINED IMAGE PROCESSOR
H. A. vanIngen Schenau, A. Pleijsier, and A. Monkel *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 8 p (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

A method for built-in-test (BIT) is described which is applied to the test of function modules of a pipeline image processor. The built-in-test is used as a support tool during the early stages of development and for integration and maintenance. The test method takes advantage of the microprocessors used to interface and control the processor modules. Test programs are inserted in the microprocessor software to test the image processor functionally with a similar data and control flow as in real-time operation. The result is a number of test picture which can be interpreted in relation to the programmed functions of the image processing. Use is made of the 2-dimensional image formats to check the performance of the unit at one glance for several functions and parameter values. Author

N85-16741# Edinburgh Univ. (Scotland). Dept. of Electrical Engineering.
BUILT-IN TEST AND SELF REPAIR MECHANISMS IN A DIGITAL CORRELATOR INTEGRATED CIRCUIT
W. S. Blackley, M. A. Jack, and J. R. Jordan *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 10 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

A Very Large Scale Integration digital correlator architecture which incorporates built-in self test and self repair mechanisms is described. The architecture offers testability and reliability, and the overhead for the test and repair circuitry is only one latch and two multiplexers per correlator stage. The correlator was fabricated on a 5-micron n metal oxide semiconductor process and results from the first batch of processed chips are reported. R.J.F.

N85-16742# Institut de Mathematiques Appliquees de Grenoble (France).
DESIGN OF SELF-CHECKING N-MOS (H-MOS) INTEGRATED CIRCUITS c33
M. Nicolaidis and B. Courtois *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 20 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

The design of self-checking N metal oxide semiconductor circuits is discussed. Two types of test are planned for the use of these circuits: on-line testing to detect failures during the function run of software; and off-line testing, with an emphasis on detection and localization for maintainability. The design of these circuits is based on transistor level fault hypotheses. The design of a functional part, the design of a checker, and procedures/design rules for a design for maintainability are addressed. R.J.E.

N85-16743# AEG-Telefunken, Ulm (West Germany).
MAINTAINABILITY: AN ILS EFFORT TO MANIPULATE LCC
Manfred Boehm *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 15 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

The concept of maintainability is discussed. The importance of maintainability in controling the life cycle costs of avionics and radar equipment is evaluated. R.J.F.

N85-16744# Toronto Univ. (Ontario).
THE PRODUCTION OF MAINTAINABLE, TRUSTWORTHY, AND PORTABLE SOFTWARE c61
E. Stewart Lee and Richard C. Holt *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 10 p refs (For primary document

see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

A method for writing computer programs in a way that promotes their maintainability, their trustworthiness, and their portability is discussed. Sound software engineering practice will produce a design which solves the right program. A fundamental decision affecting maintainability, trustworthiness, and portability is the choice of programming language and compiler. Trustworthiness is a direct result of our approach to maintainability. The language concurrent Euclid, which incorporates features to support maintainability, trustworthiness, and portability, is introduced and discussed. Several relevant properties of the Concurrent Euclid compiler are described. The technique of compiler construction used for the Concurrent Euclid compilers ensures ease of portability, with consequent extension to the practical lifetime of the program. R.J.F.

N85-16745# LITEF, Freiburg (West Germany).
DOCUMENTATION AND SEPARATE TEST PROGRAM DEVELOPMENT IS MOST IMPORTANT FOR TEST/MAINTENANCE
B. Gusmann and N. Sandner *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 11 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

Well defined development phases with standardized documentations supported by computer based tools are important for test and maintenance. Systems for transport aircraft and military applications are discussed. Documentation is stressed throughout the life cycle and the independent testing. B.G.

N85-16746# Pacific Missile Test Center, Point Mugu, Calif. Electronic Warfare Computer Resources Div.
EFFECTIVE LIFE CYCLE SOFTWARE SUPPORT: A STUDY IN DISCIPLINE AND VERSATILITY c61
George H. Smith *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 7 p (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

An effective life cycle software support capability that has evolved from emphasis being placed on a disciplined management process and a versatile set of laboratory facilities is characterized. The evolution of the capability described is still in progress. Much is yet to be accomplished in several areas. It is still very difficult to gain information in the early stages of the development cycle of a software system. Information that would enhance supportability and reduce eventual software support costs is elusive. Many of the configuration and data management functions are far too labor intensive. Great strides are possible in the automation and integration of data and documentation. As system complexities are certain to continually increase, so will the challenge to improve the approach to maintainability of the new generations of software. B.G.

N85-16747# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
EXPERIENCE IN USING ON-AIRCRAFT SOFTWARE FOR TESTING INTEGRATED SYSTEMS c61
K. Numberger *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 20 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

A need exists for test software capable of monitoring complex avionic systems during flight and delivering the collected information immediately after the mission for debriefing and maintenance, and testing complex avionic system with respect to correct functioning and integration status. It is very important that during the test run easy switching between the operational program without reloading is possible. The following feature of the co-resident program have proved the most useful input data display, in-flight moniter, and extended individual equipment/system tests. The highest priority is therefore given to optimizing the co-resident software, especially the Advanced Ground Test Facility (AGTR), while the priority for the External Ground Test Program (EGTP) refinement was downgraded. B.G.

N85-16748# California Univ., Irvine. Dept. of Information and Computer Science.
SOFTWARE TESTING IN AN ADA PROGRAMMING ENVIRONMENT c61
Richard N. Taylor *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 12 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

A variety of techniques for aiding in the software analysis and testing process have appeared over the years. Recently new techniques were developed which specifically aid in the check out of concurrent programs. These developments are considered here with an eye towards their integrated incorporation in an Ada programming support environment (APSE). Particular attention is paid to the problem of debugging concurrent software which is developed on a host machine but tested on a separate target machine. Three programming environments which illustrate some important environment design principles are described. An APSE which embodies these principles and which incorporates the new analysis and testing technologies needs to be developed. Author

N85-16749# International Business Machines Corp., Research Triangle Park, N.C.
INVESTIGATING VERSION DEPENDENCE IN FAULT-TOLERANT SOFTWARE c61
R. Keith Scott, James W. Gault (ARO, Research Triangle Park, N.C.), David F. McAllister (North Carolina State Univ., Raleigh), and Jeffery Wiggs (North Carolina State Univ., Raleigh) *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 11 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

The results are reported of an experiment conducted to validate the ability of several fault tolerant software reliability models to accurately predict system reliability. It was demonstrated that the dependent form of the model for the recovery block could predict reliability. The independent model failed to predict reliability due to version dependence. This dependence appeared to be due to the difficulty factor and not due to algorithmic dependence as might be expected. The recovery block does provide reliability gain over a single version of a program. It was demonstrated that the consensus recovery block approach to software fault tolerance was superior to the N version programming approach. R.S.F.

N85-16750# Dowty Electronics Ltd., London (England). Controls Div.
THE EFFECT ON SOFTWARE DESIGN OF TESTING BY SYMBOLIC EXECUTION c61
D. A. Rutherford and F. Lam *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 5 p (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

Some special characteristics of real time software are addressed. The cost impact on applying symbolic execution is discussed. The results obtained in a symbolic test are more comprehensive as the conditions that lead to a particular path being executed are recorded as well as the final contents of variables. A symbolic value can represent a class of numeric values. This offers the advantages of time saving in test data preparation. In the extreme, test specifications can be eliminated completely which means that the maintenance cost for the associated text document is eliminated also. An unquantifiable advantage is that symbolic execution gives the programmer more insight into the working of the module under test and thus helps to check the specification of the routine. The test captures the philosophies behind both black and white box testing. R.S.F.

N85-16751# LABEN Space Instrumentation and Systems, Milan (Italy).
RELIABLE SOFTWARE DESIGN FOR AVIONICS AND SPACE APPLICATIONS c61

P. Donzelli and G. Giannini *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 11 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

The fundamental quality requirements of space software are the reliability and testability of software products. Only a structured methodology of software design can satisfy these peculiarities producing software modules with low coupling and high strength. The production of software with these features becomes more complex when the work environment of software is a real time one. The first step toward the creation of reliable software is the introduction of a structured software design methodology properly devoted to real time applicatures. The software design methodology developed by LABEN to produce software for real time systems for space applications is discussed. R.S.F.

N85-16752# Naval Electronic Systems Command, Washington, D. C.
A WEAPON SYSTEM DESIGN APPROACH TO DIAGNOSTICS
George W. Neumann (Giordano Associates, Inc., Arlington, Va.) and Michael Battaglia *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 6 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

Providing a diagnostics capability for today's weapon systems requires a multifaceted combination of hardware, software, and personnel. The approach to providing this capability is fractionated among a number of different communities (e.g., testing, training, human engineering, publication writers). The result is reflected in the field, where the technician has been furnished a myriad of tools and documentation, which is confusing, complex and often contradictory. The result is lengthy repair times and a waste of manpower and dollars. The basic reason for this diagnostic deficiency is the lack of an integrated design approach to providing this capability and the inability to transition technological advancements to weapon systems acquisitions. Recent Department of Defense and U.S. industry efforts to solve this problem are discussed. R.S.F.

N85-16753# Research Triangle Inst., Research Triangle Park, N.C.
HARDWARE/SOFTWARE CODESIGN FOR MAINTAINABLE SYSTEMS **c60**
Geoffrey A. Frank *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 6 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

The codesign of software/hardware which can improve the maintainability of military systems is discussed. The following methods are outlined: (1) support of the design verification process to make it more complete and less costly; (2) reduction of the cost of a system modification by providing accurate, machine readable documentation of the system design; and (3) support of the detection, isolation, and correction of faults on both software and hardware. Development of techniques for software/hardware codesign of high performance signal processors is examined. The methodology is based on the representation of both software and hardware as directed graphs. The system of computer aided design (CAD) tool that support this methodology is the architecture design and assessment system (ADA). The system has two types of components: graph processing modules, which can be applied to any graph, and interfaces to specialized tools, which operate on specific kinds of graphs. The graph processing tools include an interactive graphics editor, a library manager, a Petri net analysis tool, and a Petri net simulator. The interfaces include an HDL interface, and Ada interface, and a reliability tool interface. E.A.K.

N85-16754# Duisburg Univ. (West Germany). Dept. of Electrical Engineering.
DATA STIMULATED ON-LINE-CHECKING (IROLD) **c60**
M. Trautwein *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 9 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

Concurrent monitoring of the main parts of microprogrammable microprocessor is presented by implementation of suitable coding on addresses and operands. To check transfer and storage of information and the modification of information, i.e., arithmetical and logical operations, inverse residue code (IR-code) is chosen. Error modes, IR coding theory, the hardware realization considering the microcontrol unit (MCU) and the micro-CPU (MCPU) are discussed. The overhead of hardware and processing time will be compared to a simple MP configuration without check modules. E.A.K.

N85-16755# McDonnell Aircraft Co., St. Louis, Mo.
AVIONICS FAULT TREE ANALYSIS AND ARTIFICAL INTELLIGENCE FOR FUTURE AIRCRAFT MAINTENANCE
Michael E. Harris and Thomas D. Snodgrass *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 12 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

The avionics fault tree analyzer (AFTA) was developed as an interim support tool for the Navy prior to attainment of total organic support capability, and as an alternate method of support to reduce life cycle/cost for F/A-18 foreign military sales. With the transformation of the AFTA concept from ground support equipment to avionics, a quantitative improvement in life cycle costs will be obtained through the application of artificial intelligence (AT) techniques. The AI is expected to see applications to practical problems in many disciplines; and one of which is the implementation of military fault diagnostic systems. A smart BIT was developed which will reduce false alarms, identify intermittent failures, and improve fault isolation to the lowest possible element by AI technique. Increasing density of computer memory, modularly designed avionic functions and the use of very large scale, and high speed integrated devices will allow future aircraft to fly with the AFTA function. Ramifications such as eliminating the need for intermediate avionic repair facilities, increased aircraft operational readiness, decrease in aircraft recurring costs, and a reduction in spares investment are discussed. The AFTA concept, life cycle cost advantages, and the implementation of artificial intelligence in future avionic designs relative to improved reliability and maintainability are summarized. E.A.K.

N85-16756# LABEN Space Instrumentation and Systems, Milan (Italy).
AUTOMATIC ERROR DETECTION AND RECOVERY TECHNIQUES IN ONBOARD INTELLIGENT UNITS FOR SPACE AND AVIONIC APPLICATION
R. Ranieri and R. Redaelli *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 4 p (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

The introduction of the microprocessors onboard spacecrafts has given a powerful tool to the system designers but has on the other hand created a lot of problems to the reliability engineers. The fault tolerance of intelligent units are characterized and the most useful design tools that are available are described. Some hints on their implementation as a result of several years of experience with spaceborne microprocessor based units are presented. E.A.K.

N85-16757*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MISSIONS AND VEHICLE CONCEPTS FOR MODERN, PROPELLED, LIGHTER-THAN-AIR VEHICLES
Mark D. Ardema Dec. 1984 48 p refs
(NASA-TM-86672; A-85077; NAS 1.15:86672) Avail: NTIS HC A03/MF A01 CSCL 01B

The results of studies conducted over the last 15 years to assess missions and vehicle concepts for modern, propelled, lighter-than-air vehicles (airships) were surveyed. Rigid and non-rigid airship concepts are considered. The use of airships for ocean patrol and surveillance is discussed along with vertical heavy

lift airships. Military and civilian needs for high altitude platforms are addressed. R.S.F.

N85-16758* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 182)
Jan. 1985 140 p
(NASA-SP-7037(182); NAS 1.21:7037(182)) Avail: NTIS HC $6.00 CSCL 01A

This bibliography lists 475 reports, articles and other documents introduced into the NASA scientific and technical information system in December 1984. Author

N85-16759*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPUTER SIZING OF FIGHTER AIRCRAFT
Peter G. Coen and Willard E. Foss, Jr. Jan. 1985 22 p Presented at 23rd AIAA Aerospace Sci. Meeting, Reno, Nev., 14-17 Jan. 1985
(NASA-TM-86351; NAS 1.15:86351) Avail: NTIS HC A02/MF A01 CSCL 01B

The computer sizing technique has been applied to a number of military mission profiles. Performance data can be determined for all segments of the selected profile, which typically include takeoff, climb, cruise, loiter, reserve and landing segments. Options are available for detailed calculation of combat performance and energy-maneuverability characteristics. Configuration changes, such as external fuel tank drop and weapon expenditure, can be included in the mission. In the sizing mode, aircraft gross weight, wing loading, and thrust-to-weight ratio are varied automatically to determine which combinations meet the design mission radius. The resulting performance data can be used to create a thumbprint plot. This plot is useful in determining the configuration size that best satisfies the mission and performance requirements. The sizing mode can also be used to perform parametric studies such as sensitivity of gross weight to alternate design conditions. Author

N85-16760# Federal Aviation Administration, Washington, D.C. Office of Management Systems.
FAA (FEDERAL AVIATION ADMINISTRATION) STATISTICAL HANDBOOK OF AVIATION, CALENDAR YEAR 1983 · Annual Report
31 Dec. 1984 199 p
(AD-A148171) Avail: NTIS HC A09/MF A01 CSCL 01/2

This report presents statistical information pertaining to the Federal Aviation Administration, the National Airspace System, Airports, Airport Activity, U.S. Civil Air Carrier Fleet, U.S. Civil Air Carrier Operating Data, Airmen, General Aviation Aircraft, Aircraft Accidents, Aeronautical Production and Imports/Exports, and a Glossary of the terms used in this publication. Author (GRA)

N85-16761# Logistics Management Inst., Bethesda, Md.
THE AIR FORCE STOCK FUND AND AIRCRAFT AVAILABILITY
C. H. Hanks Oct. 1984 63 p
(Contract MDA903-81-C-0166)
(AD-A148653; LMI-AF301-4) Avail: NTIS HC A04/MF A01 CSCL 15/5

The methods and results of this work represent a first step in quantifying the relation between consumable parts and end-item readiness. This working note addresses the effect on aircraft availability rates if safety levels in the wholesale Air Force stock fund were to change. (Safety levels are the stock levels maintained to cover variations in demand.) The results are that as many as 150 additional aircraft, Air Force-wide, could become unavailable due to parts, if safety levels fell to the extent that wholesale fill rates dropped 5 points, from 85% to 80%. GRA

N85-16762# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INTERNATIONAL AVIATION (SELECTED ARTICLES)
Tong, W. Ye, Z. Kehan, and Z. Ziqian 13 Nov. 1984 32 p Transl. into ENGLISH from Guoji Hang Kong (China), no. 254, Apr. 1984 p 13-19, 46-47
(AD-A148704; FTD-ID(RS)T-0969-84) Avail: NTIS HC A03/MF A01 CSCL 01/1

Progress in international aerodynamic research is reported. The development of highly efficient supersonic and highly maneuverable fighter planes is predicted. The structure with forward swept wings has good maneuverability and low transonic drag. Transport aircrafts, V/STOL aircrafts, and fighter aircrafts were tested. Air jet propulsion technology and the development of target tracking display systems are described. E.A.K.

N85-16763# Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION
15 Jan. 1985 193 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UTR-85-001) Avail: NTIS HC A09/MF A01

Trends in the design of Soviet aircraft are explored as well as improvements in equipment for agricultural aircraft and in runway surfacing. An automated communication system for Aeroflot and a solution for the braking problems on the IL-76 aircraft are discussed. For individual titles, see N85-16764 through N85-16770.

N85-16764# Joint Publications Research Service, Arlington, Va.
DIRECTOR ON INSTITUTE'S CIVIL AVIATION PROJECTS
R. Sakach *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 1-3 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 30 Oct. 1984 p 2 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

Technologies being developed for the utilization of aircraft in land reclamation and in the use of reclaimed land for agriculture are discussed. The modernization and production of equipment for handling liquid and powered chemicals and biologicals for the An-2 and Ka-26 helicopter; the fitting of aircraft with accessories for cargo drop operations and transporting externally suspended materials; and systems for the aerial observation of crop conditions are needed to increase the nation's food supply. Capabilities of the Tu-134SKh (agricultural) aircraft for the nonphotographic mapping of the Earth's surface are described. A.R.H.

N85-16765# Joint Publications Research Service, Arlington, Va.
DESIGNER ON AEROFLOT AUTOMATED COMMO SYSTEM DEVELOPMENT c32
O. Goncharova *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 4-5 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 17 Nov. 1984 p 3 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

Aeroflot digital communication collects and distributes data with a multilevel structure, each level of which is intended for preliminary processing of the data. On the first level, the airborne communications unit performs the initial collection and processing of flight performance information and transmits it to the ground communications center. On the second level, the data comes in from a group of aircraft accommodated by a given digital line. On the third level, the data coming in at the message switching center are processed and distributed among the civil aviation ground services. Capabilities of Aeroflot are compared with those of systems used in the United States and in Western European countries. A.R.H.

N85-16766# Joint Publications Research Service, Arlington, Va.
TESTING SOLUTION FOR IL-76 BRAKING SYSTEM PROBLEM c05
V. Lamzutov *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 6-8 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 30 Aug. 1984 p 3 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

Landing gear buffeting was noted on IL-76 aircraft returning with only a safe fuel reserve after having delivered cargo to the

North. Experimental flights revealed that the automatic braking unit was at fault. Following adjustments to the braking unit, pilots were given instruction on how to fly the aircraft so as to avoid the buffeting and how to combat buffeting should it arise. One flight conducted to determine how the the unit behaves on a runway under various landing conditions and the kind of braking performance obtained is described. A.R.H.

N85-16767# Joint Publications Research Service, Arlington, Va.
INTERNATIONAL PROJECTS, OTHER WORK OF AEROPROYEKT INSTITUTE
V. Berezin *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 9-11 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 29 Sep. 1984 p 3 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

Soviet activities conducted towards implementing an agreement to cooperate in the development of international airports include working with: (1) Cuba to reconstruct the San Jose Marti International Airport; (2) Czechoslovakia to develop a device for evaluating runway surface braking conditions; (3) East Germany on a device for ground servicing of aircraft; (4) Canada on increasing aircraft safety and operational availability, modeling systems for a warning of ice formation, evaluating pavement uniformity, and designing a mobile air terminal; and (5) France on the design of construction methods, equipment, and operational techniques for aircraft. One result of this cooperation is the joint preparation of ICAO recommendations on fuel facility distribution and the development of devices for measuring the runway traction coefficient. A.R.H.

N85-16768# Joint Publications Research Service, Arlington, Va.
DESIGNER ON CIVIL AIRCRAFT DESIGN TRENDS IN USSR **c05**
S. Yeger *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 14-17 Transl. into ENGLISH from Nedelya (Moscow), no. 33, 13-19 Aug. 1984 p 12-13 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

Further reduction in fuel consumption, weight, and drag are drivers affecting aircraft design in the coming decades. Technology needs include more economical engines; multi-bladed propellers; improved production techniques for cabin sealing and paint thickness distribution; and short takeoff and landing aircraft. Long range routes being flown by aircraft similar to the IL-86 are foreseen. Medium haul routes should see the appearance of aircraft capable of handling 180 to 200 passengers, with more economical engines, longer wingspans, and slightly wider fuselages. Short haul aircraft should have new generation turboprop or turbofan engines. A.R.H.

N85-16769# Joint Publications Research Service, Arlington, Va.
IMPROVED SPRAYER FOR AN-2 CROPDUSTING WORK **c05**
A. Sobachkina *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 18-19 Transl. into ENGLISH from Vozdushnny Transp. (Moscow), 25 Sep. 1984 p 2 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

The amount of land fertilized in one day was increased by 400 hectares using a modified, wide-band ducted sprayer carried by an AN-2 aircraft. The sprayer can operate from dirt- and snow-covered airfields since its lowest components are mounted at least 430 mm above the ground. The unit assures uniform distribution (with a variation rate of 20 to 25%) and has a lower drag coefficient than its predecessor. This allows a savings of up to 11 kilograms of fuel per flight hour. A.R.H.

N85-16770# Joint Publications Research Service, Arlington, Va.
AEROPROYEKT DEVELOPS IMPROVED RUNWAY SURFACING **c09**
A. Vinogradov *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 20-21 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 25 Sep. 1984 p 3 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

A framed pavement design for aircraft was developed. Prior to concreting, I-beams are placed on the prepared surface of a runway so that, after welding, they form frames. One frame cell covers an area of some 50 square meters. After concreting, each cell forms a finished plate framed by the metal form. The frame acts as a form during concreting and prevents edge creep. Later, as the concrete hardens, the frame becomes an excellent joint component. This type pavement was accepted for operational use at one airport. Work on all-weather pavement is progressing. A.R.H.

N85-16771# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
IMPROVEMENT OF AERODYNAMIC PERFORMANCE THROUGH BOUNDARY LAYER CONTROL AND HIGH LIFT SYSTEMS
Loughton (England) Aug. 1984 423 p refs In ENGLISH and FRENCH Conf. held in Brussels, 21-23 May 1984
(AGARD-CP-365; ISBN-92-835-0358-9) Avail: NTIS HC A18/MF A01

Theoretical and experimental developments are reported in the use of both traditional and non-traditional means of boundary layer control for external flow applications such as lift-augmentation, drag reduction and improved effectiveness of controls, and for internal flow applications such as air intakes and exit configurations. Techniques included shaping (geometry) suction and blowing transverse blowing; vortex generators; heating and cooling; and turbulent boundary layer manipulation. Boundary layer control on characteristics of wings and wing-body arrangements that involve flaps, slats and jets (blown flaps), and vortex flaps is covered. For individual titles, see N85-16772 through N85-16796.

N85-16772# British Aerospace Aircraft Group, Weybridge (England).
RECENT PROGRESS OF DEVELOPMENT AND UNDERSTANDING OF HIGH LIFT SYSTEMS **c02**
D. J. Butter *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 26 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

The mechanical high lift device as it is used for transport type aircraft is discussed. Current design approaches are reviewed along with progress on both the development of high lift device design and on the understanding of the related flow physics. Likely future developments and the fundamental research required to achieve them are also addressed. M.G.

N85-16773# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
INVESTIGATIONS INTO THE EFFECTS OF SCALE AND COMPRESSIBILITY ON LIFT AND DRAG IN THE RAE 5m PRESSURIZED LOW-SPEED WIND TUNNEL **c02**
S. P. Fiddes, D. A. Kirby, D. S. Woodward, and D. H. Peckham *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 7 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

Results obtained from experiments in the RAE 5m low speed pressurized wind tunnel are presented. The tunnel is capable of operation over a range of pressures (from one to three atmospheres) so that the effects of Mach and Reynolds number may be separated. This decoupling of scale and compressibility effects makes possible reliable extrapolation of test results to full-scale conditions (where this is necessary) as well as giving greater insight into the underlying flow mechanisms. The large size of the tunnel, combined with pressurization to three atmospheres, enabled some tests, on small combat/trainer aircraft and on bomb-like stores, to be carried out at full scale. Three facets of the work of the 5m tunnel are described: work aimed at predicting or improving the high lift performance of specific aircraft; work of a more fundamental nature concerned particularly with the optimization of high-lift devices on generalized research models; and work on the drag of stores carried externally on combat aircraft. Author

N85-16774# National Aerospace Lab., Amsterdam (Netherlands).
RECENT ADVANCES IN COMPUTATIONAL METHODS TO SOLVE THE HIGH-LIFT MULTI-COMPONENT AIRFOIL PROBLEM **c02**
B. Oskam, D. J. Laan, and D. F. Volkers *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 31 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

Recent advances made in the analysis of viscous flow over high-lift multi component airfoil configurations are described. The calculation of viscous wakes subjected to large adverse pressure gradients is considered. The local supersonic flow over the slat of a high-lift configuration, with a free stream Mach number of around 0.2, is also addressed. Development of a computational method for turbulent wakes in adverse pressure gradient, including strong inviscid-viscous interaction, has improved the understanding of such phenomena as the off-the-surface pressure recovery capability of viscous wakes. The example of a wing with double-slotted flap shows that the wake, flowing into a region of higher pressure, may play a critical role that has not been recognized before. Results of the transonic panel method, solving the full potential equation, and the experimental data both show high local velocities reaching Mach numbers up to 1.6 at a free stream Mach number of 0.225. R.S.F.

N85-16775# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
DETAILED STUDY OF THE FLOW AROUND A MULTI-ELEMENT AIRFOIL. COMPARISON WITH CALCULATIONS [ETUDE DETAILLEE DE L'ECOULEMWNT AUTOUR D'UN PROFIL HYPERSUSTENTE COMPARISONS AVEC LES CALCULS] **c02**
B. Porcheron and J. J. Thibert *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 7 p refs In FRENCH; ENGLISH summary (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

Results are discussed for studies using a theoretical method for computing the viscous incompressible flow around multi-element airfoils as well as an experimental study of the flow around such configurations. The velocity profiles and the turbulence measurements around a multi-element airfoil clearly show the interaction between boundary-layer and wakes even when these are not merging and they have been used to draw accurate maps of the flow. The computing method of the flow around these configurations is based upon a panel method (both sources and vortices) for the inviscid part of the flow and a method providing calculation and coupling for boundary layers and wakes, under strong viscous interaction conditions. This method has given quite good results even when there are several simultaneous separated flow regions. The comparisons between computation and experiment described underline the necessity of improving the computing method in the region located above the flap. A.R.H.

N85-16776# Manchester Univ. (England). Dept. of the Mechanics of Fluids.
INVISCID COMPRESSIBLE FLOW PAST A MULTI-ELEMENT AEROFOIL **c02**
I. M. Hall and A. Suddhoo *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 15 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

A conformal transformation method is used to generate an orthogonal curvilinear grid for two and three-element airfoil configurations. The compressible potential flow equations are solved by finite difference methods. The solution could serve as a starting point for an iterative solution of the full viscous compressible flow case. R.S.F.

N85-16777# National Aerospace Lab., Amsterdam (Netherlands).
DESIGN OF AN AIRFOIL LEADING EDGE SLAT USING AN INVERSE AERODYNAMIC CALCULATION METHOD **c05**
J. A. vanEgmond and B. vandenBerg *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 11 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

In order to evaluate the applicability of the design system MAD (multi-element airfoil design), a design study was performed for a two-dimensional wing with leading edge slat. The problem is representative for that of a transport airplane operating out of high altitude airfields requiring a high lift-to-drag ratio at takeoff. A two-dimensional high life configuration tested earlier in a low speed wind tunnel was selected as the starting configuration. The design system MAD is described briefly. The actual leading edge slat design is given. The new slat-wing configuration as tested in a wind tunnel and some of the test results are presented together with results of the baseline configuration. R.S.F.

N85-16778# Southampton Univ. (England).
MODELLING CIRCULATION CONTROL BY BLOWING **c08**
M. M. Soliman, R. V. Smith, and Yeovil I. C. Cheeseman *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 7 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

A theoretical representation of circulation control based on discrete vortex modelling techniques is described. The application of discrete vortex modelling to the prediction of circulation control is initially momentum, due to viscous and entrainment effects was represented in the model by decaying the strength of each vortex as it flows downstream from the slot. The model's application was extended to predict the effect of circulation control on other shapes of airfoil. The application of the model to an elliptic section is included as an example of any airfoil section that can be represented in a potential flow. The model has had considerable success in predicting the lift produced from such bodies due to the jet, but information about the drag requires additional modelling of the surface boundary layer. A similar technique was used to represent the boundary layer by discrete vortices and doublets. The model's prediction was compared with the experimental data of an unblown circular cylinder. R.S.F.

N85-16779# Naples Univ. (Italy).
TURBULENT BUBBLES BEHIND AIRFOILS AND WINGS AT HIGH ANGLE OF ATTACK **c34**
V. Losito and G. Torella *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 13 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

More accurate inviscid and viscous flow models are needed for simulating the main features of the turbulent bubbles in the near wakes behind airfoils at high angles of attack. Descriptions of these flows are not sufficiently detailed to allow accurate modelling for the recirculating flow regions. Numerical and wind tunnel experiments are required to ensure convergence criteria and wake closure conditions at different Reynolds numbers. A simple relation was found which correlates the airfoils viscous lift loss with the location of the upper surface separation point and lift predicted in full attached flow conditions. This simple two-dimensional model was extended to three-dimensional wing flows with embedded turbulent bubbles after a set of wind tunnel experiments and oil-flow visualizations. A fast and efficient method is given for predicting spanwise load distribution and C sub L max for finite unswept wings. R.S.F.

N85-16780# Boeing Military Airplane Development, Seattle, Wash.
AERODYNAMIC ISSUES IN THE DESIGN OF HIGH-LIFT SYSTEMS FOR TRANSPORT AIRCRAFT **c05**
Bertil Dillner, Fred W. May, and John H. McMasters *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 22p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

The design of the high lift system has a profound effect on the sizing and total performance of transport aircraft, both civil and military. The fundamentals of high lift system design are reviewed along with the phenomena that govern their performance. The computational methods available to the high lift designer, with examples of their validity, are presented. New developments in flow diagnostic techniques are reviewed. Examples of several Boeing high lift design efforts are given. Emphasis is placed on the use of computational aerodynamic methods and the synergistic effect of using those methods in parallel with testing. A list of todays ten most important issues in high lift aerodynamics is presented. R.S.F.

N85-16781# De Havilland Aircraft Co. of Canada Ltd., Downsview (Ontario).
AN UPDATE OF THE CANADA/USA AUGMENTOR-WING PROJECT **c05**
D. C. Whittley *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 8 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

Following extensive tests of a half scale model in the NASA, Ames 40' x 80' wind tunnel, a minimum cost flight demonstrator was built based on the de Havilland Buffalo airframe. Following completion of the NASA trials in 1980, work has continued in Canada covering four main areas of interest using the augmenter wing powered lift concept: (1) additional flight trials on the technology demonstrator aircraft; (2) propulsion system development; (3) experimental investigation of a new compound supercritical airfoil; and (4) project definition studies. E.A.K.

N85-16782# Lockheed-Georgia Co., Marietta. Advanced Flight Sciences.
AIRCRAFT DRAG REDUCTION TECHNOLOGY **c05**
Andrew S. W. Thomas *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and high Lift Systems Aug. 1984 20p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

The current techniques of aircraft viscous drag reduction and some of the more recent developments that have taken place in this technology are reviewed. The various sources and relative contributions of aircraft drag are described including skin friction drag, pressure drag, interference drag and lift induced drag. The physical processes that lead to these drag contributions are emphasized and methods of reducing the impact of these drag sources are discussed. It is shown how innovative and optimized aircraft configurations can lead to drag benefits. E.A.K.

N85-16783# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France).
APPLICATION OF TWO AND THREE-DIMENSIONAL CRITERIA FOR CALCULATING TRANSITIONS AND BOUNDARY LAYERS OVER SWEPT WINGS **c02**
D. Arnal and E. Coustols *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 19 p refs In FRENCH; ENGLISH summary (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

The possible origins of turbulence on an infinite swept wing are examined. A method for calculating the beginning of transition, and the transition region itself, is suggested for the three dimensional flow. The influence of sweep angle on transition and on drag coefficient of the airfoil and the efficiency of wall suction are discussed. E.A.K.

N85-16784# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
THEORETICAL STUDY OF BOUNDARY-LAYER CONTROL **c02**
E. H. Hirschel *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 11p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

The inviscid flow past the upswept rear part of a fuselage is directed beneath the fuselage. This leads to an accumulation of boundary layer material at the lower side of the fuselage which might be prone to separation. The cross sections of the rear end of a typical transport airplane fuselage were modified from the original circles to rounded triangles, in this way shifting downward the centers of gravity of the cross sections. The side view contour, the width of the fuselage and the volume remain unchanged. Three different configurations without wing and tail unit were studied, the original and two modified ones. The inviscid flow was computed with the MBB panel method, the boundary layer development with the integral method of Cousteix and Aupoix for three dimensional turbulent, compressible flow. It is shown that less boundary layer material is transported under the rear part of the fuselage in the modified cases. The tendency of the skin friction lines to converge is reduced. The whole flow pattern at the base is improved. In the frame of boundary layer theory, however, no statement can be made about possible pressure drag reductions. An improvement of the elevator performance appears to be probable. The study shows that the upsweep of the fuselage is the main factor in the boundary layer development. The addition of the wing and the tail unit will only modify the picture. E.A.K.

N85-16785# Bochum Univ. (West Germany).
DRAG REDUCTION DUE TO BOUNDARY-LAYER CONTROL BY COMBINED BLOWING AND SUCTION **c02**
J. Wiedemann and K. Gersten *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 10p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

The boundary control system of combined blowing and suction was investigated. Blowing is applied in the front part of the body where the pressure gradient is favorable, whereas suction is applied in the rear part of the body where adverse pressure gradients exist. To avoid the sink drag the volume rate of suction should be equal or smaller than the blowing volume rate. Theoretical investigations of laminar flows include optimization of the blowing velocity distribution and second order boundary layer effects such as pressure drag and displacement effects on friction drag. Experimental results of turbulent boundary layers with very strong blowing velocities near the stagnation point of a circular cylinder are used as a basis of a simple prediction method. Experiments on a circular cylinder show considerable drag reductions due to the combined blowing and suction boundary layer control system. E.A.K.

N85-16786# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
DESIGN STUDIES OF THICK LAMINAR FLOW AIRFOILS FOR LOW SPEED FLIGHT EMPLOYING TURBULENT BOUNDARY LAYER SUCTION OVER THE REAR PART **c05**
J. L. vaningen, J. J. H. Blom, and J. H. Goei *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 19 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

Computational tools, used to analyze and design airfoils for low speed flight (prediction of potential flow pressure distributions, laminar boundary layer flows, transition prediction using the e(n) method and Head's entrainment method for the calculation of turbulent boundary layers are described. These tools are used to design pressure distributions and corresponding airfoil shape producing long runs of natural laminar flow. Inevitably this results in airfoils with the maximum thickness far backwards, eventually leading to separation of the turbulent boundary layer over the rear part of the airfoil. This turbulent boundary layer separation is prevented by selecting a proper pressure distribution over the rear part and/or suction of the turbulent boundary layer through slots or distributed perforations. Design charts are presented which help to select the required pressure distributions for laminar and turbulent flow. B.W.

N85-16787*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TECHNOLOGY DEVELOPMENTS FOR LAMINAR BOUNDARY LAYER CONTROL ON SUBSONIC TRANSPORT AIRCRAFT c02

Richard D. Wagner, Dal V. Maddalon, and Michael C. Fischer *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 13 p refs Previously announced in IAA as A84-33137 (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01 CSCL 01A

The development of laminar flow technology for commercial transport aircraft is discussed and illustrated in a review of studies undertaken in the NASA Aircraft Energy Efficiency (ACEE) program since 1976. The early history of laminar flow control (LFC) techniques and natural laminar flow (NLF) airfoil designs is traced, and the aims of ACEE are outlined. The application of slotted structures, composites, and electron beam perforated metals in supercritical LFC airfoils, wing panels, and leading edge systems is examined; wind tunnel and flight test results are summarized; studies of high altitude ice effects are described; and hybrid (LFC/NLF designs are characterized. Drawings and photographs are provided. (IAA)

N85-16788*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TURBULENT DRAG REDUCTION RESEARCH c02

D. M. Bushnell, J. B. Anders, M. J. Walsh, and R. V. McInville (North Carolina State Univ.) *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 13 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01 CSCL 01A

Research in the area of turbulent drag reduction for attached flows is summarized. The most promising passive techniques utilize non-planar geometry. Of particular interest is the suitability of these devices for retrofit of existing vehicles. Five methods for reducing turbulent skin friction drag on bodies/fuselages are discussed. They are: (1) large-eddy breakup devices; (2) riblets; (3) slot injection optimization; (4) control of Emmons spot generation; and (5) relaminarization through massive suction. Except for the Emmons spot work these methods all indicate the possibility of sizable net reductions in skin friction for laboratory conditions. B.W.

N85-16789*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON THE RELAXATION OF A TURBULENT BOUNDARY LAYER AFTER AN ENCOUNTER WITH A FORWARD FACING STEP c02

D. I. A. Poll and R. D. Watson (Cranfield Inst. of Tech., Bedford, England) *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 10 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01 CSCL 01A

An experiment was performed in a low speed wind-tunnel to determine the mean flow relaxation characteristics for a zero pressure gradient turbulent boundary layer which encounters a small forward facing step. Of primary interest is the behavior of the local wall shear stress downstream of the step. This was determined by the use of a series of buried hot-wire gauges. The mean velocity profiles downstream of the step were measured using a traversing Pitot tube and these have indicated that a step produces very marked changes in the distribution for both the inner and outer regions of the flow. The results shed new light upon the variation of wall shear stress downstream of a severe perturbation and also indicate that the use of Preston tube or Clauser chart methods for the determination of wall shear may lead to very large errors. As a consistency check on the data, estimates of the step drag based upon force-momentum conservation considerations were compared with previously published drag balance measurements. The agreement between the data sets is very good. B.W.

N85-16790*# Aeronautical Research Inst. of Sweden, Bromma.
FULL SCALE EXPERIMENTS INTO THE USE OF LARGE EDDY BREAKUP DEVICES FOR DRAG REDUCTION ON AIRCRAFT c05

Arild Bertelrud *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 16 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

An experimental investigation in flight was performed to explore the feasibility of using LEBU (Large-Eddy-Breakup) devices to reduce the drag of aircraft. Two geometrical shapes of ribbons were used, and the development of local skin friction was monitored downstream. The aircraft was a swept-wing attack aircraft, and the flights covered the entire subsonic regime from M=0.92 down to stall conditions; flight altitudes were 1, 4.5, 7 and 10 km to explore various combinations of angle of attack, Mach - and Reynolds numbers. Some information was obtained concerning the turbulence characteristics downstream, and a discussion of the downstream amplification due to the drag at the device is also presented. B.W.

N85-16791# Technische Hogeschool, Delft (Netherlands).
PNEUMATIC TURBULATORS: A DEVICE FOR DRAG REDUCTION AT REYNOLDS NUMBERS BELOW 5 MILLION c05

K. H. Horstmann, A. Quast, and L. M. M. Boermans *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 19 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

At Reynolds numbers below 5 million, airfoils are affected by laminar separation bubbles which in many cases considerably increase the drag. By blowing air from a row of orifices at the beginning of the laminar separation bubble, the bubble can be prevented and the drag can be reduced substantially. This device is called a pneumatic turbulator. Free-stream total pressure is sufficient to provide the turbulator bleed air. The additional drag caused by the bleed air and the air jets is negligible. The low drag Reynolds number range of laminar airfoils can be extended by using pneumatic turbulators. R.J.F.

N85-16792# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
SHOCK/TURBULENT BOUNDARY LAYER INTERACTION AND ITS CONTROL c02

Jean Delfry *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 41 p refs In FRENCH; ENGLISH summary (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/ MF A01

Some fundamental properties of the interaction between shock waves and boundary layers are considered for the basic configuration. The following features are examined: upstream interaction length, incipient shock-induced separation and the evolution of the boundary-layer main characteristics. Both transonic and supersonic flows are considered. The most investigated means for controlling shock/boundary-layer interaction are presented, with emphasis on the physical description of the flow phenomena involved in this process. Briefly speaking, control methods can be classified into two categories: those acting on the boundary-layer properties before interaction with the shock (e.g., wall cooling, wall mass transfer, upstream blowing), and those having a local action in the shock foot region (suction or injection, boundary-layer removal). The most appropriate technique depends in fact on the specific application under consideration. Finally, some calculation methods are briefly presented. Most of them are restricted to laminar interactions. R.J.F.

N85-16793# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
INTEREST OF INTERNAL BLEED FOR A TWO-DIMENSIONAL AIR INTAKE OPERATING IN A WIDE MACH NUMBER RANGE (1.8-3 PLUS) c02

G. Laruelle, C. Sans, and R. Lefebvre (Societe National Industrielle Aerospatiale, Chatillon, France) *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 10 p refs In FRENCH; ENGLISH summary (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

From a two-dimensional air intake with an internal bleed and optimized for approximately Mach number 2, a new configuration is sought allowing still good performance up to Mach number 3 plus, but with the minimum of movable parts. The main geometrical parameters are: the slope of the external compression ramp; the internal section law of the diffuser; and the inlet section of the internal bleed. The internal bleed and the advantage of a variable geometry are discussed, as well as the model which was built at large scale and its equipment; motorizations, measurement devices, and internal visualizations. The tests were performed in a supersonic wind tunnel. A movie shows shadowgraphs of the flow in the air intake geometrical throat, where the internal bleed is located, for several configuration changes (external ramp or diffuser wall rotations, increases of Mach number or angle of attack), and variable internal obstruction. Some results obtained with this air-intake model are explained. The choice of two configurations allowing correct performance in the studied Mach number range, by optimization of the internal bleed geometry, is commented on. R.J.F.

N85-16794# Centre d'Etudes Aerodynamiques et Thermiques, Poitiers (France).
OBLIQUE SHOCK WAVE-TURBULENT BOUNDARY LAYER INTERACTION ON A POROUS WALL WITH SUCTION [INTERACTION ONDE DE CHOC OBLIQUE: COUCHE LIMITE TURBULENTE SUR PAROI POREUSE AVEC ASPIRATION] **c02**
D. B. Lee and R. Leblanc *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 11 p refs In FRENCH (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

The interaction of an oblique shock wave with a turbulent boundary layer subjected to two rates of suction was analyzed theoretically and experimentally. The general equations were solved using a finite different method. The approach is direct and used a prescribed pressure gradient. Cebeci and Smith's algebraic turbulence model is completed by taking into account mass transfer. First comparisons with the experiment at M = 1.43, for a boundary layer of a smooth wall without interaction, shows that it is necessary to simulate roughness upstream of the suction zone, for a correctly adapted blowing. Three cases of oblique shock waves interactions created by a deviation of 3 deg at M = 1.43 with the turbulent boundary layer of the wall are studied. The experimental methods describe the interaction region, differing according to whether the wall is solid or porous and according to the suction rate. The evolution of the subsonic layer is more destabilized by the roughness which is influenced by moderate suction. It is concluded that both mass transfer and roughness must be considered together to study a coupling which considers the vertical pressure gradient. Transl. by A.R.H.

N85-16795# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
ACTIVE AND PASSIVE SHOCK/BOUNDARY LAYER INTERACTION CONTROL ON SUPERCRITICAL AIRFOILS **c02**
P. Thiede, P. Krogmann (Deutsch Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen, West Germany), and E. Stanewsky (Deutsch Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen, West Germany) *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 13 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

Experimental investigations aiming at the improvement in the off-design performance of supercritical airfoils by active or passive control of the shock/boundary layer interaction (SBLI) through boundary layer suction in the shock region or ventilation respectively are presented. The experiments were carried out in a transonic wind tunnel using an advanced supercritical airfoil designed to have a largely fixed shock position at off-design conditions. The basic model was equipped with an exchangeable control device within the shock region of allow measurements with either surface clean, suction through a single slot, double slot or perforated strip, or ventilation through a double slot or perforated strip. The effectiveness of the different SBLI control methods is evaluated from surface pressure distribution, wake and boundary layer measurements, and Schlieren observations. It is shown that local boundary layer suction in the shock region mainly delays the shock-induced separation to greater shock strength and stabilizes the shock in its rearward position up to higher incidence, resulting in substantial improvements in the airfoil characteristics at off-design conditions. Without any suction a favorable passive effect is observed by boundary layer ventilation on the double slot and perforated strip configurations with a plenum underneath. A weakening of the shock wave results, offering a large potential for off-design drag reductions. R.J.F.

N85-16796# West Virginia Univ., Morgantown.
TRANSONIC SHOCK INTERACTION WITH A TANGENTIALLY-INJECTED TURBULENT BOUNDARY LAYER **c02**
G. R. Inger *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 10 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

A non-asymptotic triple deck theory of transonic shock/turbulent boundary layer interaction is described which takes into account the influence of upstream tangential injection on a curved wall. In addition to Reynolds number and the shock strength, the theory is parameterized by arbitrary values of the incoming boundary layer shape factor, wall jet maximum velocity ratio, and the nondimensional height of this ratio; results of a comprehensive parametric study are then presented. It is shown that the wall jet effects significantly reduce both the streamwise scale and displacement thickening of the interaction zone. While increasing the upstream and downstream skin friction levels, these effects also reduce the minimum interactive skin friction and thus actually hasten the onset of incipient separation at the shock foot. Author

N85-16797# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
HELICOPTER GUIDANCE AND CONTROL SYSTEMS FOR BATTLEFIELD SUPPORT
Loughton, England Aug. 1984 284 p refs In ENGLISH and FRENCH Conf. held in Monterey, Calif., 8-11 May 1984 (AGARD-CP-359; ISBN-92-835-0365-1) Avail: NTIS HC A13/MF A01

Requirements and operational use of future helicopters; new methods of briefing helicopter crews and tactically setting up the mission systems before and during the flight, flight control, displays, communications, and navigation; sensors and weapon systems integration in overall cockpit design; and simulation and flight research are discussed. For individual titles, see N85-16798 through N85-16821.

N85-16798# Aerospace Engineering Test Establishment, Cold Lake (Alberta).
OPERATIONAL REQUIREMENTS VERSUS TECHNOLOGICAL CAPABILITIES
Shawn Coyle *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 9 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

The lessons learned in the wartime use of helicopters, and the impact that modern technology can have on what have become common themes are discussed. Lessons learned, the constraints on helicopter operations, and the requirements of the battlefield helicopter are integrated to show where technology would better serve the operators. Performance monitoring, handling qualitites and radio communications examples are presented, and a brief

outline of how existing technology could be used to update an existing helicopter is made. Author

N85-16799# Ferranti Ltd., Edinburgh (Scotland). Navigation Systems Dept.
AUTOMATIC BRIEFING AND MISSION MANAGEMENT SYSTEMS FOR BATTLEFIELD SUPPORT c06
C. G. W. Roads *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 6 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

Mission planning and briefing systems were used for almost a decade to make the best use of advanced avionics fitted to high performance fixed-wing aircraft. As similar equipment is fitted to helicopters to enable them to perform on the battlefield the need for mission briefing systems will become apparent. How such a system might be used in the context of a hypothetical future operation is described and in doing so seeks to highlight some of the technical problems which will be encountered in developing and fielding such equipment. The interaction of the databases which could be exploited by such system are considered, and whether the equipment in service today is developing towards the future systems described. B.G.

N85-16800# Anacapa Sciences, Inc., Santa Barbara, Calif.
A COMPUTER-GENERATED TOPOGRAPHIC DISPLAY SYSTEM FOR NAVIGATION AND MISSION PLANNING IN HELICOPTERS c06
Steven P. Rogers *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 11 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

The Integrated Mission-Planning Station (IMPS) is a computer-generated topographic display system. The IMPS will provide not only a greatly enhanced navigation capability, but also a combination of dramatic improvements in cartographic support, map information content, and aviator-map interactions. The powerful computational capability of the IMPS can be used to present a shaded relief map, to display areas masked from visual or radar observation, to construct perspective views of key terrain, to support a self-contained terrain correlation navigation system, and to permit rapid solutions to problems of previously forbidding complexity. The tasks conducted to provide detailed human factors engineering specifications for the construction and programming are described. The outcome of these efforts is described in terms of an overview of system components and functions. Each of the major functions of the IMPS system is discussed, and the operational requirements, present deficiencies, and IMPS capabilities are identified. Author

N85-16801# Thomson-CSF, Issy les Moulineaux (France).
MAP DISPLAY FOR HELICOPTERS c06
Pierre Cholle *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 16 p refs In ENGLISH and FRENCH (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

Modern combat helicopters have to be adapted to a context of constantly increasing crew work load. The electronic map display is a way to greatly reduce navigation tasks. Present position of the aircraft is continuously provided and allows for very fast navigation up-dating. North-up and Track-up modes are also possible. A continuous zoom is used to enlarge some details. A joystick is used to manually move the map for visualization of other zones. Different maps scales are available. If the helicopter's display system is powerful enough it is also possible to create an interactive console giving the crew the ability to memorize data on the map before the mission and in real time during the flight. Author

N85-16802# Department of National Defence, Ottawa (Ontario).
DEVELOPMENT OF A HELICOPTER INTEGRATED NAVIGATION SYSTEM c04
D. F. Liang, W. R. Clubine, L. C. Vallot (Honeywell Systems and Research Center, Minneapolis, Minn.), and J. K. Mahesh (Honeywell Systems and Research Center, Minneapolis, Minn.) *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 19 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

The Canadian Department of National Defence has initiated a project to develop and test a helicopter integrated navigation system (HINS) that is capable of satisfying all the operational requirements of shipborne, antisubmarine warfare helicopters. The HINS mission requirements, development plan and its basic hardware and software configurations are discussed. The integrated system is expected to bring forth vital benefits in mission reliability, operational efficiency and navigation accuracy. Additional benefits are in terms of the size, weight, height and cost, etc. In the current phase of this work, extensive simulation software packages have been generated to accurately represent the operational characteristics of various off-the-shelf candidate subsystems. An Integrated System Evaluation Program has been developed which takes into account the various characteristics of the navigation subsystems and the mission requirements to systematically evaluate a sequence of candidate configurations. B.W.

N85-16803# Standard Elektrik Lorenz A.G., Stuttgart (West Germany).
HIGH ACCURACY DOPPLER NAVIGATION EMPLOYING OPTIMUM INTEGRATED POSITION FIX INFORMATION c04
H. Hug *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 8 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

The basic accuracy limitations of today's Doppler navigation systems are mainly caused by sensor errors and calibration errors. The navigation error of a typical Doppler system equipped with a magnetic compass is therefore about 1 % to 2 % of the distance travelled. The presented approach for improved accuracy is based on the usually applied method of position fixing to reset the error at specific waypoints. The measured errors are used as an input to a Kalman Filter which estimates various error parameters and continuously compensates for the actual navigation error. Details of the implemented Kalman Filter algorithm are given. Simulation results based on computer generated synthetic flight data and recorded real flight data are presented. B.W.

N85-16804# Naval Air Development Center, Warminster, Pa.
STANDARD ATTITUDE HEADING REFERENCE SYSTEM (SAHRS) FULL SCALE DEVELOPMENT PROGRAM c04
Kenton L. Bachman *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 12 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

There is a recognized need within the military services for reliable, low cost-of-ownership Attitude Heading Reference Systems (AHRS) capable of operating for extended periods without the need for calibration or regularly scheduled maintenance. In recognition of this need, the military services have embarked upon a joint service full scale engineering development program to provide a Standard Attitude Heading Reference System (SAHRS) utilizing strapdown technology for a multiplicity of rotary and fixed wing platforms. System design concepts, and performance characteristics are described. Procurement and schedules are also discussed. B.W.

N85-16805# Racal Avionics Ltd., New Malden (England).
INTEGRATED CONTROL AND DISPLAY SYSTEMS FOR HELICOPTER BATTLEFIELD MISSION MANAGEMENT c06
Martin A. Richardson *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 7 p (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

The avionics requirements of an integrated crew station for battlefield helicopters are discussed. An example of the approach taken to equip a multi-role light attack helicopter is provided. B.W.

N85-16806# Societe de Fabrication d'Instruments de Mesure, Massy (France).
A DIGITAL PILOTING SYSTEM FOR THE COMBAT HELICOPTER [SYSTEME NUMERIQUE DE PILOTAGE POUR HELICOPTERE DE COMBAT] **c06**
J. C. Derrien *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 13 p refs In FRENCH (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

For several years, SFIM has specialized in the development of digital systems for piloting the helicopter. A sophisticated environment for simulation for the design of future systems has been created and used in recent years for the design and adjustment of systems for complete in-flight evaluation on several types of helicopters. General methods for the design and integration of such systems, the PAN 1 digital piloting system coupled to the 26SH strap-down attitude unit, and an HCL coupling system for hovering which is itself, connected to the VENUS pointing system are discussed. The system being developed at SFIM which was completely adapted for the combat helicopter is examined.
Transl. by A.R.H.

N85-16807# Elmer, Rome (Italy).
TACTICAL HF COMMUNICATION FOR MILITARY HELICOPTERS USING THE NVIS MODE **c32**
G. Puccetti and P. L. Como *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 9 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

The use of loop antennas for tactical HF communications on board of military helicopters was investigated. The helo platform is considered for land or maritime scenarios. The experiments on the SH-3D helicopter compared the loop antennas and existing wire antennas. Groundwave radiated field at different azimuth angles were measured for the two antenna types, particularly at the lower end of the frequency range where the difference in the antenna geometry is more significant. A consistent better performance of the loop over the wire, typically a 16 dB to 8 dB improvement is indicated. Skywave propagation tests at different distances and altitude of the helicopter were conducted. It is found that the performance of the loop antenna is superior to the wire. It is concluded that the loop antenna is an ideal radiator for use onboard aircraft and helicopters because of its dimensions, increased efficiency, and radiation characteristics. E.A.K.

N85-16808# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
EVALUATION OF NOSE, ROOF, AND MAST MOUNTED SENSOR PLATFORMS FOR PILOTING AND SIGHTING, INTEGRATED IN FUTURE COMBAT HELICOPTERS **c06**
H.D.V. Boehm and R.D.V. Reth *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 16 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

The piloting and sighting tasks under day, night and adverse weather conditions for a combat helicopter are different. For sighting the helicopter needs a well adapted sensor package, which may consist of a high performance FLIR, a direct view glass optic, a TV-channel and a tracker with a boresighting module. For the piloting task it is possible to use a complex sensor system including a helmet mounted sight and display (HMS/D) and/or night vision goggles (NVG). Different aspects of nose-, roof-, and mast-mounted sights (NMS, RMS, NMS) for a gunner and present and future weapon systems are discussed. Advanced electro-optical systems with a high performance telescope, allowing an increased combat range are considered. An advanced multisensor approach where the more conventional systems are supplemented or partially replaced by a multimode imaging radar is examined. The sensor for piloting can be integrated with the sighting system or located in a position remote from the sight. The pilot needs a dedicated display in the form of either a head-down display (HDD) or a helmet mounted display (HMD). A superimposed symbology adapted to the phase of the mission e.g., cruise, transition or hover, is required in either case. E.A.K.

N85-16809# Crouzet Aerospace and Systems, Valence (France).
RECENT METHODS FOR CALIBRATING THE ANEMOMETRY OF HELICOPTERS AT LOW SPEEDS [NOVELLES METHODES D'ETALONNAGE DE L'ANEMOMETRIE DES HELICOPTERES AUX BASSES VITESSES] **c06**
J. Mandle *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 12 p refs In FRENCH (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

Improvements made by Crouzet to make classic methods of calibrating anemometry compatible with the flight domain of helicopters are discussed as well as proposed new material. The limitations of the classic methods are examined, the improvements defined, and equipment installed for these new methods at the Brittany Flight Test Center are described. Transl. by A.R.H.

N85-16810# AEG-Telefunken, Ulm (West Germany).
LPI-RADAR FOR HELICOPTER OBSTACLE WARNING **c32**
H. Meinel, H.-G. Wippich, B. Rembold, and W. F. X. Frank *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 7 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

Employing the frequency range of maximum atmospheric attenuation around 60 GHz, a short range obstacle warning radar for helicopters was developed which can be operated under low probability of intercept conditions. Test flights with this noncoherent solid state radar showed that power cables as well as tall trees can be detected, even under adverse weather conditions. System considerations and test results are described. R.J.F.

N85-16811# Westland Helicopters Ltd., Yeovil (England).
THE DESIGN AND DEVELOPMENT OF AN INTEGRATED CORE SYSTEM FOR BATTLEFIELD HELICOPTERS **c06**
S. D. Roy and P. L. Shillito *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 10 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

Integrated control systems for Lynx and Westland combat helicopters are discussed. Navigation, communications, and weapons systems integration is addressed, as well as an architecture which not only enables the crew to manage and control the systems and aircraft on the battlefield, but provides a means of extending the performance of the total system-crew, avionics, and aircraft. R.J.F.

N85-16812# Army Avionics Research and Development Activity, Fort Monmouth, N. J.
EVOLUTION TOWARD A MULTI-BUS ARCHITECTURE FOR ARMY HELICOPTER AVIONIC SYSTEMS **c06**
Joseph A. Dasaro *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 7 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

An attempt to arrive at an architecture which fits the avionics technology available today and that which will be available in the near future is described. Current efforts to implement this technology in the U.S. Army Avionics Laboratory are using currently available microprocessors configured as a multiprocessor and an available Ada compiler. A procurement strategy evolved in parallel with this architecture that uses form, fit, function specifications and interface control documents so as not to restrict future procurements to today's technology. Certainly much work remains to be accomplished to evolve the concept presented here; however, it is fully expected that over the next several years, enough experience should be gained to achieve an architecture that should meet the needs for the demanding helicopter missions of the future. A.R.H.

N85-16813# Bell Helicopter Co., Fort Worth, Tex.
INTEGRATION OF SENSOR FUSION IN ADVANCED HELICOPTER COCKPIT DESIGN **c06**
George L. Cohill, Dora D. Strother, and Harold B. Henderson (Texas Instruments, Dallas, Tex.) *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 9 p (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

Effective operation and survival in the battlefield of the future can impose great demands on helicopter weapon systems and the crews who manage them. Among these are: time to detect and respond to threats and targets; ability to integrate many types of sensor data and assess the intelligence portrayed by these sensors; and requirements for highly trained systems management personnel who can process highly technical information while operating in the very demanding NOE environment. Helicopter cockpit designs for the future and how crew performance can be improved are discussed and subsystems are addressed which can improve human performance. Sensor fusion systems, related misconceptions and their proposed use are highlighted. It is shown that the fused system is more reliable, less costly, lighter, and has more performance potential. System fusion provides a way to unload the harried system operator and assure mission success at a cost/performance ratio that decreases proportionally with overall system complexity. A.R.H.

N85-16814*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A REVIEW OF US ARMY AIRCREW-AIRCRAFT INTEGRATION RESEARCH PROGRAMS **c08**
David L. Key and Edwin W. Aiken *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 15 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01 CSCL 01C

The desire of the Army for a one crew helicopter that can perform the scout and attack role is forcing the integration of handling qualities and mission management disciplines and concerns. Some recent studies and results in these disciplines are reviewed. The need for a more unified approach to support new helicopter development is described along with a plan to develop fundamental principles needed for efficient man machine interface design. R.S.F.

N85-16815# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
ADVANCED FLIGHT SIMULATION FOR HELICOPTER DEVELOPMENT **c09**
H. Huber, H.-J. Dahl, and A. Inglsperger *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 14 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

A simulation capability for both fixed wing and rotary wing aircraft has been developed. The fixed based simulator consists of interchangeable cockpit stations, a computer generated imagery (CGI) visual system, both coupled with the math model simulation computer. Specific integration rigs for avionics, flight controls, and weapon systems can be operated with the simulator. The simulation system is described including cockpit/interface hardware, visual display system, and mathematical modeling. The simulation validity is demonstrated by the verification of the mathematical model and by pilot judgments. Typical simulation tasks for future military applications are discussed. It is concluded that the existing simulator provides a valid tool for helicopter system development. R.S.F.

N85-16816# Centre d'Electronique de l'Armement, Bruz (France).
A SIMULATOR FOR STUDYING HELICOPTER WEAPONS SYSTEMS [UN SIMULATEUR D'ETUDES DE SYSTEMS D'ARMES HELICOPTERE] **c09**
Michel Huon *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 12 p refs In FRENCH (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

A simulator designed to study air to air missile and cannon fire against a helicopter is described. The pilot station is fixed and located in a sphere which serves as a screen on which a TITUS tube projects a synthetic image of the landscape defined by 10,000 facets (SOGITEC G I 10,000 processor). The field is covered from 80 degrees around and is completed by horizon projection. A 250 faceted projector generates the target. A transparent, symbolic sighting tube is projected on the sphere by a power tube. The pilot uses a helmet mounted display. The marksman's apparatus is offset and involves a main sighting tube with presentation of a G I 10,000 image and weapons control. Vibration seats are provided. Ambient noise is supplied by a programmable noise generator. The complete simulator is operated from a test direction station. A.R.H.

N85-16817# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ASSESSMENT OF SIMULATION FIDELITY USING MEASUREMENTS OF PILOTING TECHNIQUE IN FLIGHT **c09**
Warren F. Clement (Systems Technology, Inc., Mountain View, Calif.), William B. Cleveland, and David L. Key *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 12 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01 CSCL 14B

The U.S. Army and NASA joined together on a project to conduct a systematic investigation and validation of a ground based piloted simulation of the Army/Sikorsky UH-60A helicopter. Flight testing was an integral part of the validation effort. Nap-of-the-Earth (NOE) piloting tasks which were investigated included the bob-up, the hover turn, the dash/quickstop, the sidestep, the dolphin, and the slalom. Results from the simulation indicate that the pilot's NOE task performance in the simulator is noticeably and quantifiably degraded when compared with the task performance results generated in flight test. The results of the flight test and ground based simulation experiments support a unique rationale for the assessment of simulation fidelity: flight simulation fidelity should be judged quantitatively by measuring pilot's control strategy and technique as induced by the simulator. A quantitative comparison is offered between the piloting technique observed in a flight simulator and that observed in flight test for the same tasks performed by the same pilots. R.S.F.

N85-16818# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
FLIGHT TESTS WITH A NEW HELICOPTER FORCE FEEL SYSTEM (FFS) **c05**
R. D. vonReth, H. Koenig, and G. Turck *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 11 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

An artificial force feel system for the control of the pitch and roll axes of a Bo 105 helicopter was studied. Goals of the program were to investigate if the use of such an artificial force feel system for the helicopter control would increase flight safety, allow a more precise control of a flight path, increase stability, and reduce pilot workload. An experimental flight worthy system using the electro-hydraulic actuators for the pitch and roll axis respectively was implemented in the flying simulator Bo 105-53. A number of different force control laws were derived and flight tested. Although some contributions to the total control force were rated very differently by the various test pilots (e.g., contributions from the normal acceleration), as a general trend very favorable ratings were obtained. Two examples of these favorable ratings for highly dynamic maneuvers (slalom and dolphin) are an improved stability of the trim state and an improved flight path control in general. M.G.

N85-16819# Rome Univ. (Italy).
HELICOPTER ACTIVE CONTROL WITH ROTOR BLADES RELAXATION **c08**
Achille Danesi and Arturo Danesi *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 17 p

refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

An active modal control for high performance combat helicopters in forward flight is presented. A gust alleviation control (G.A.C.) strategy based on the spectral data computed from the flexible blade structural mode of vibration measurements, is employed to relax, by appropriate longitudinal cyclic pitch modulation, the flat wise bending moments induced by environmental disturbances. The restoring cyclic pitch commands are derived processing the output data from an electro-optical laser sensor by means of a microprocessor performing the spectral power density real time computations; these data, obtained implementing a fast fourier transform algorithm and observed within a frequency window centered at the first bending mode frequency, are employed as a measure of the actual vibrational level existing on the blade. To reduce the helicopter rigid response sensitivity to the G.A.C. system actuators, its driving signals are applied to the longitudinal pitch decoupling unit making the helicopter attitude and vertical velocity component decoupled, the last one regulated by the collective pitch channel through a radioaltimeter closure. The effectiveness of the G.A.C. system is investigated by digital simulations. M.G.

N85-16820# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
FLIGHT RESEARCH ON VISUSL AIDS AND NAVIGATION EQUIPMENT FOR HELICOPTER LOW-LEVEL FLIGHT AT NIGHT c06
Ralf Beyer *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 8 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

An avionic/optronic system comprising night goggles, electronic head down display and Doppler navigation was tested in a Bo 105 helicopter in low level flight at night. Particular emphasis was given to the assessment of system performance and pilot workload. The results obtained as well as the methods and procedures applied are discussed in a way that similar experiments in the future may benefit from the outcome. Author

N85-16821*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT AND FLIGHT TEST OF A HELICOPTER COMPACT, PORTABLE, PRECISION LANDING SYSTEM CONCEPT c06
John S. Bull, George R. Clary, Thomas J. Davis, and John P. Chisholm (Sierra Nevada Corp., Reno) *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 8 p refs Previously announced as N84-24566 (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01 CSCL 01D

An airborne, radar based, precision approach concept is being developed and flight tested as a part of NASA's Rotorcraft All-Weather Operations Research Program. A transponder based beacon landing system (BLS) applying state of the art X band radar technology and digital processing techniques, has been built and is being flight tested to demonstrate the concept feasibility. The BLS airborne hardware consists of an add on microprocessor, installed in conjunction with the aircraft weather/mapping radar, which analyzes the radar beacon receiver returns and determines range, localizer deviation, and glide slope derivation. The ground station is an inexpensive, portable unit which can be quickly deployed at a landing site. Results from the flight test program show that the BLS concept has a significant potential for providing rotorcraft with low cost, precision instrument approach capability in remote areas. Author

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N85-16822 Illinois Univ., Urbana-Champaign.
AN OPTIMIZATION METHOD FOR THE PRELIMINARY DESIGN OF INTERPLANETARY AEROBRAKING MISSIONS Ph.D., Thesis
Stephen James Hoffman 1984 161 p
Avail: Univ. Microfilms Order No. DA8422080

The use of atmospheric drag to circularize spacecraft orbits, a concept referred to as aerobraking, can significantly increase the useful payload mass fraction for various types of missions. A procedure is devised which determines the optimal combination of aerobrake shielding area and initial orbit period to maximize the spacecraft mass in the final orbit. Two computer codes are constructed and the results from each are compared. The first simulation assumes only aerodynamic drag perturbations and uses simplified analytical expressions. The second is a detailed numerical integration including perturbations due to drag, atmospheric rotation, planet oblateness, third-body effects, and solar radiation pressure. Hypersonic aerodynamic heating rate equations for two different shield configurations are discussed and their performances are compared. Illustrative numerical examples for a Venus and a Mars mission are included. Dissert. Abstr.

N85-16823 Michigan Univ., Ann Arbor.
SHOCK WAVES IN TRANSONIC FLOWS AT MODERATE REYNOLDS NUMBER Ph.D. Thesis
James Lewis Mace 1984 244 p
Avail: Univ. Microfilms Order No. DA8422281

The behavior of shock waves in transonic flow with varying Reynolds and Prandtl numbers was examined using analytical and numerical methods. The method of matched asymptotic expansions was used to provide analytical solutions for both an inviscid and a viscous, thermally-conducting flow moving at transonic speeds in a symmetric channel. Also, analytical solutions were obtained for the structure of a shock wave in a viscous, thermally-conducting flow moving at transonic speeds about an airfoil. Finally, a finite-volume numerical method was used to provide solutions to inviscid, transonic flows in a channel. It was shown that, to the accuracy desired, the location of the sonic line within the structure of a shock wave is independent of Reynolds number and, thus, coincident with the location of the corresponding discontinuous wave in the limit as Reynolds number tends to infinity. Also, in a numerical solution, truncation errors and artificial viscosity produce a smeared shock wave which is similar to that found in a flow at moderate Reynolds number. Dissert. Abstr.

N85-16824 Brown Univ., Providence, R. I.
AN EXPERIMENTAL STUDY ON THE INSTABILITY OF A MIXING-LAYER WITH LAMINAR WAKE AS THE INITIAL CONDITION Ph.D. Thesis
Jiun-Jih Miau 1984 303 p
Avail: Univ. Microfilms Order No. DA8422462

The experiments were carried out to study the instability in the developing region of the plane mixing-layer where the mean flow has not yet assumed the hyperbolic-tangent shape. The Reynolds number of the high speed stream is about 270, based on the displacement thickness of the boundary layer at the trailing edge of the splitter vane and the free stream velocity. The experimental results indicate the following features. The linear instability growth measured in the developing region is consistent with the predictions of the spatial linear instability theory for the local mean flow profile. The initial nonlinear instability development in this region is signified by the streamwise growth of the first harmonic component fluctuation. The large scale structure in this region is revealed by the conditional sampling technique. The ensemble-averaged structures show that in the upstream portion

of the developing region the large scale structure in the high speed stream is governed by the shear of the mean flow in the same stream and in the downstream hyperbolic-tangent region it evolves to be governed by the shear due to the velocity difference between the high and the low speed streams. Dissert. Abstr.

N85-16825*# Atlanta Univ., Ga.
RANDOM EQUATIONS IN AERODYNAMICS Semiannual Progress Report, 1 Oct. 1983 - 1 Apr. 1984
Albert T. Bharucha-Reid 1 Apr. 1984 3 p
(Grant NAG1-413)
(NASA-CR-174279; NAS 1.26:174279) Avail: NTIS HC A02/MF A01 CSCL 01A

Literature was reviewed to identify aerodynamic models which might be treated by probablistic methods. The numerical solution of some integral equations that arise in aerodynamical problems were investigated. On the basis of the numerical studies a qualitative theory of random integral equations was developed to provide information on the behavior of the solutions of these equations (in particular, boundary and asymptotic behavior, and stability) and their statistical properties without actually obtaining explicit solutions of the equations. B.G.

N85-16826*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HELICOPTER MODEL ROTOR-BLADE VORTEX INTERACTION IMPULSIVE NOISE: SCALABILITY AND PARAMETRIC VARIATIONS
W. R. Splettstoesser (DFVLR, Brunswick), K. J. Schultz (DFVLR, Brunswick), D. A. Boxwell, and F. H. Schmitz Dec. 1984 31 p refs Prepared in cooperation with Army Research and Technology Labs., Moffett Field, Calif.
(NASA-TM-86007; A-9854; NAS 1.15:86007; TM-84-A-7) Avail: NTIS HC A03/MF A01 CSCL 01A

Acoustic data taken in the anechoic Deutsch-Niederlaendischer Windkanal (DNW) have documented the blade vortex interaction (BVI) impulsive noise radiated from a 1/7-scale model main rotor of the AH-1 series helicopter. Averaged model scale data were compared with averaged full scale, inflight acoustic data under similar nondimensional test conditions. At low advance ratios (mu = 0.164 to 0.194), the data scale remarkable well in level and waveform shape, and also duplicate the directivity pattern of BVI impulsive noise. At moderate advance ratios (mu = 0.224 to 0.270), the scaling deteriorates, suggesting that the model scale rotor is not adequately simulating the full scale BVI noise; presently, no proved explanation of this discrepancy exists. Carefully performed parametric variations over a complete matrix of testing conditions have shown that all of the four governing nondimensional parameters - tip Mach number at hover, advance ratio, local inflow ratio, and thrust coefficient - are highly sensitive to BVI noise radiation. Author

N85-16827*# George Washington Univ., Washington, D.C. School of Engineering and Applied Science.
VECTORIZABLE MULTIGRID ALGORITHMS FOR TRANSONIC FLOW CALCULATIONS M.S. Thesis
Norman Duane Melson Jan. 1985 100 p
(NASA-CR-174326; NAS 1.26:174326) Avail: NTIS HC A05/MF A01 CSCL 01A

The analysis and incorporation into a multigrid scheme of several vectorizable algorithms are discussed. Von Neumann analyses of vertical line, horizontal line, and alternating direction ZEBRA algorithms were performed; and the results were used to predict their multigrid damping rates. The algorithms were then successfully implemented in a transonic conservative full-potential computer program. The convergence acceleration effect of multiple grids is shown and the convergence rates of the vectorizable algorithms are compared to the convergence rates of standard successive line overrelaxation (SLOR) algorithms. M.G.

N85-16828*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FIRST DERIVATIVES OF FLOW QUANTITIES BEHIND TWO-DIMENSIONAL, NONUNIFORM SUPERSONIC FLOW OVER A CONVEX CORNER Ph.D. Thesis - George Washington Univ.
Christine M. Darden Jan. 1985 16 p refs
(NASA-TM-86272; L-15840; NAS 1.15:86272) Avail: NTIS HC A02/MF A01 CSCL 01A

A method of determining spatial derivatives of flow quantities behind an expansion fan as a function of the curvature of the streamline behind the fan is developed. Taylor series expansions of flow quantities within the fan are used and boundary conditions satisfied to the first and second order so that the curvature of the characteristics in the fan may be determined. A system of linear equations for the spatial derivatives is then developed. An application of the method to shock coalescence including asymmetric effects is described. Author

N85-16829*# Missouri Univ., Rolla. Dept. of Mechanical and Aerospace Engineering.
AERODYNAMIC-STRUCTURAL STUDY OF CANARD WING, DUAL WING, AND CONVENTIONAL WING SYSTEMS FOR GENERAL AVIATION APPLICATIONS Final Report
Bruce P. Selberg and Donald L. Cronin Feb. 1985 87 p refs
(Contract NAG1-26)
(NASA-CR-172529; NAS 1.26:172529) Avail: NTIS HC A05/MF A01 CSCL 01A

An analytical aerodynamic-structural airplane configuration study was conducted to assess performance gains achievable through advanced design concepts. The mission specification was for 350 mph, range of 1500 st. mi., at altitudes between 30,000 and 40,000 ft. Two payload classes were studied - 1200 lb (6 passengers) and 2400 lb (12 passengers). The configurations analyzed included canard wings, closely coupled dual wings, swept forward - swept rearward wings, joined wings, and conventional wing tail arrangements. The results illustrate substantial performance gains possible with the dual wing configuration. These gains result from weight savings due to predicted structural efficiencies. The need for further studies of structural efficiencies for the various advanced configurations was highlighted. Author

N85-16830*# New York Univ., New York. Inst. of Mathematical Sciences.
THE NYU INVERSE SWEPT WING CODE Final Report
F. Bauer, P. Garabedian, and G. McFadden Washington NASA Jan. 1983 101 p refs
(Grants NsG-1579; NGR-33-016-201)
(NASA-CR-3662; NAS 1.26:3662) Avail: NTIS HC A06/MF A01 CSCL 01A

An inverse swept wing code is described that is based on the widely used transonic flow program FLO22. The new code incorporates a free boundary algorithm permitting the pressure distribution to be prescribed over a portion of the wing surface. A special routine is included to calculate the wave drag, which can be minimized in its dependence on the pressure distribution. An alternate formulation of the boundary condition at infinity was introduced to enhance the speed and accuracy of the code. A FORTRAN listing of the code and a listing of a sample run are presented. There is also a user's manual as well as glossaries of input and output parameters. Author

N85-16831*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STEADY- AND UNSTEADY-PRESSURE MEASUREMENTS ON A SUPERCRITICAL-WING MODEL WITH OSCILLATING CONTROL SURFACES AT SUBSONIC AND TRANSONIC SPEEDS
Maynard C. Sandford and Rodney H. Ricketts Jan. 1983 285 p refs
(NASA-TM-84543; L-15509; NAS 1.15:84543) Avail: NTIS HC A13/MF A01 CSCL 01A

A high aspect ratio supercritical wing with oscillating control surfaces is described. The semispan wing model was instrumented with 252 static pressure orifices and 164 in situ dynamic pressure gages for studying the effects of control surface position and sinusoidal motion on steady and unsteady pressures. Results from the present test (the third in a series of tests on this model) were

obtained in the Langley Transonic Dynamics Tunnel at Mach numbers of 0.60, 0.78, and 0.86 and are presented in tabular form. Author

N85-16832# Nielsen Engineering and Research, Inc., Mountain View, Calif.
PREDICTION OF CRUCIFORM ALL-MOVABLE CONTROL CHARACTERISTICS AT TRANSONIC SPEEDS Final Technical Report, 1 Jan. 1983 - 31 Mar. 1984
J. N. Nielsen, F. K. Goodwin, and M. F. E. Dillenius Mar. 1984 258 p
(Contract N00014-81-C-0267; F41-411)
(AD-A147291; NEAR-TR-321) Avail: NTIS HC A12/MF A01 CSCL 20/4

A study has been made of the feasibility of developing a transonic hinge-moment prediction method for cruciform all-movable controls by correlating an extensive data base using the equivalent angle of attack concept. Body vortex effects have been handled using a simplified vortex model. Existing data from the Army generalized missile have been studied to examine transonic nonlinearities including pitch-yaw coupling and fin-fin control interference. Data for an aspect ratio 3.53, taper ratio 0.06 canard fin have been successfully correlated on the basis of the equivalent angle-of-attack concept. Data for an aspect ratio 2 delta fin mounted aft on the triservice missile have also been studied for angle of attack to 20% for Mach numbers of 0.8 and 12. Methods of extending the range of applicability of a previous hinge-moment prediction method have been developed. Desirable future extensions have been pointed out. GRA

N85-16833# Aeronautical Research Labs., Melbourne (Australia).
CALCULATION OF THE VELOCITY FIELD GENERATED BY A HELICOPTER MAIN AND TAIL ROTORS IN HOVER
K. J. Hayman and K. R. Reddy Jul. 1984 19 p
(AD-A147731; ARL-AERO-TM-366) Avail: NTIS HC A02/MF A01 CSCL 20/4

A theory is presented to calculate the flow field due to main and tail rotors of a helicopter in hovering flight. To solve this complex flow problem, simple vortex rings are used to model main and tail rotor wakes. Preliminary numerical results are found to be encouraging. Author (GRA)

N85-16834# Rockwell International Corp., Los Angeles, Calif. North American Aircraft Operations.
JOINED WING TRANSONIC DESIGN AND TEST VALIDATION Final Report, 30 Sep. 1982 - 31 May 1984
J. A. Clyde, E. Bonner, T. P. Goebel, and L. Spacht 22 Jun. 1984 158 p
(Contract N00014-82-C-0601; NR Proj. 212-276)
(AD-A148355; NA-84-1434) Avail: NTIS HC A08/MF A01 CSCL 20/4

A tactical supercritical flow research model was designed to achieve high aerodynamic efficiency at Mach number 0.90 and lift coefficient 0.50 using numerical transonic design procedures. A wind tunnel model was built and tested in the Rockwell International Trisonic Wind Tunnel at Mach numbers of 0.40, 0.85, 0.90, 0.95. Lift-drag ratio at the design condition compared favorably with theoretical upper bound levels for the test arrangement and conditions. Six component force measurements for the joined wing are well behaved and near linear over an angle-of-attack range of $-4 < \text{alpha} < 10$ degrees. Stable stall is naturally achieved for the arrangement. Weak changes in longitudinal and lateral-directional stability and control with pitch angle exist. GRA

N85-16835# Naval Surface Weapons Center, White Oak, Md. Underwater Systems Dept.
A THEORETICAL VIEW ON THE STRESS ANALYSIS OF FULLY INFLATED PARACHUTE CANOPIES
W. P. Ludtke 28 May 1984 72 p
(AD-A148387; NSWC/TR-84-204) Avail: NTIS HC A04/MF A01 CSCL 01/3

This report describes a theoretical approach to the analysis of the force distribution in fully inflated parachute canopies based upon the inflated gore mainseam shape. Normal and tangential forces for any arbitrary point along the gore mainseam can be determined and the magnitude and location of the maximum normal force and cloth stress evaluated. Methods, criteria, and rationale for calculating the force distributions are presented. GRA

N85-16836# Analytical Methods, Inc., Redmond, Wash.
PREDICTION OF DYNAMIC STALL CHARACTERISTICS USING ADVANCED NON-LINEAR PANEL METHODS Final Report, 1 Nov. 1982 - 17 Apr. 1984
B. Maskew and F. A. Dvorak 4 Apr. 1984 63 p
(Contract F49620-82-C-0019)
(AD-A148453; AMI-8406; AFOSR-84-0975TR) Avail: NTIS HC A04/MF A01 CSCL 20/4

A surface singularity panel method was extended for modeling the dynamic interaction between a separated wake and a surface undergoing an unsteady motion. The method combines the capabilities of an unsteady, time-stepping code and a technique for modeling extensive separation using free vortex sheets. Routines were developed for treating the dynamic interaction between the separated wake and the solid boundary in an environment where the separation point is moving with time. The behavior of these routines is being examined in a parallel effort using a two-dimensional pilot version of the three-dimensional pilot version of the three-dimensional code. This allows refinements in the procedures to be quickly developed and tested prior to installation into the main code. The extended code was coupled with an unsteady integral boundary layer method to examine the prediction of dynamic stall characteristics. The boundary layer code is accessed during the time-step cycle and provides the separation locations as well as the boundary layer displacement effect: the latter is modelled in the potential flow code using the source transpiration technique. The preliminary results include basic unsteady test cases for both the potential flow and boundary layer routines. GRA

N85-16837# Neilsen Engineering and Research, Inc., Mountain View, Calif.
RESEARCH INTO TOPICS IN TRANSONIC FLOW THEORY Final Technical Report, 1 Jun. 1983 - 30 Sep. 1984
D. Nixon Nov. 1984 56 p
(Contract N00014-83-C-0456)
(AD-A148526; NEAR-TR-331) Avail: NTIS HC A04/MF A01 CSCL 20/4

The contract concerned certain research topics in transonic flow, mainly addressing the questions of why corrections for entropy and viscosity to transonic potential theory were large in certain cases. The physical implications arising from the accurate use of each of these corrections are incompatible. The investigations is due to the fact that the potential equation admits non-unique solution branches and that the corrections, in addition to modeling entropy and viscosity, allow the potential solution to change to the correct branch. The study into the causes of the nonuniqueness was based on an integral equation formulation and the following results obtained: (1) The nonuniqueness only occur if there is a supersonic domain in the flow, (2) A nonunique solution does not have the same supersonic domain as the real solution, (3) The solution often can be made unique in steady flow by using a mixed conservative/nonconservative algorithm; this cannot be guaranteed however, and (4) There is no way to differentiate between a solution that is physically correct and one that is not physically correct. GRA

N85-16838# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Abt. Theoretische Aerodynamik.
THEORETICAL CONTRIBUTIONS TO TRANSONIC FLOW ANALYSIS FOR TRANSPORT AIRCRAFT Final Report, Dec. 1982
Willy Fritz, Stefan Leichner, Wolfgang Schmidt, and Hans-Werner Stock Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 125 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-84-036; ISSN-0170-1339) Avail: NTIS

HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 26,50

Two and three dimensional computational methods were improved for the analysis of transonic aircraft. Viscous flow modeling and the analysis of unsteady transonic flow were emphasized. A fast method was developed for computation of viscous airfoil flow, and a finite volume method for general wing-body combinations, coupled with three-dimensional boundary-layer packages. Two and three-dimensional unsteady transonic flow solutions were derived for the analysis of flutter and active control devices. Author (ESA)

N85-16839# Rolls-Royce Ltd., Derby (England).
A COMPARISON OF MEASURED AND PREDICTED UNSTEADY PRESSURE ON A FAN BLADE IN UNSTALLED SUPERSONIC FLUTTER
M. J. Brooker and D. G. Halliwell 1 Sep. 1984 16 p refs Presented at 3rd Aeroelasticity Symp., Cambridge, England, Sep. 1984 Sponsored by UK Ministry of Defence
(PNR-90223) Avail: NTIS HC A02/MF A01

Measurements on a transonic fan vibrating in a coupled flutter mode are compared with finite element predictions, in terms of unsteady amplitude and phase angle of the blade surface pressures. Unsteady effects on the blade section are studied, and the separate lift and moment contributions are identified. Using measured results the variation of these parameters with radius is examined. The comparisons are favorable compared with earlier unsteady flow methods. Substantial shock wave oscillation in the blade passage at engine-order frequencies, even at speeds well below flutter onset, is noted. Author (ESA)

N85-16772# British Aerospace Aircraft Group, Weybridge (England).
RECENT PROGRESS OF DEVELOPMENT AND UNDERSTANDING OF HIGH LIFT SYSTEMS
D. J. Butter *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 26 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16773# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
INVESTIGATIONS INTO THE EFFECTS OF SCALE AND COMPRESSIBILITY ON LIFT AND DRAG IN THE RAE 5m PRESSURIZED LOW-SPEED WIND TUNNEL
S. P. Fiddes, D. A. Kirby, D. S. Woodward, and D. H. Peckham *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 7 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16774# National Aerospace Lab., Amsterdam (Netherlands).
RECENT ADVANCES IN COMPUTATIONAL METHODS TO SOLVE THE HIGH-LIFT MULTI-COMPONENT AIRFOIL PROBLEM
B. Oskam, D. J. Laan, and D. F. Volkers *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 31 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16775# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
DETAILED STUDY OF THE FLOW AROUND A MULTI-ELEMENT AIRFOIL. COMPARISON WITH CALCULATIONS [ETUDE DETAILLEE DE L'ECOULEMWNT AUTOUR D'UN PROFIL HYPERSUSTENTE COMPARISONS AVEC LES CALCULS]
B. Porcheron and J. J. Thibert *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 7 p refs In FRENCH; ENGLISH summary (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16776# Manchester Univ. (England). Dept. of the Mechanics of Fluids.
INVISCID COMPRESSIBLE FLOW PAST A MULTI-ELEMENT AEROFOIL
I. M. Hall and A. Suddhoo *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 15 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16783# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France).
APPLICATION OF TWO AND THREE-DIMENSIONAL CRITERIA FOR CALCULATING TRANSITIONS AND BOUNDARY LAYERS OVER SWEPT WINGS
D. Arnal and E. Coustols *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 19 p refs In FRENCH; ENGLISH summary (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16784# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
THEORETICAL STUDY OF BOUNDARY-LAYER CONTROL
E. H. Hirschel *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 11p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16785# Bochum Univ. (West Germany).
DRAG REDUCTION DUE TO BOUNDARY-LAYER CONTROL BY COMBINED BLOWING AND SUCTION
J. Wiedemann and K. Gersten *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 10p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16787*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TECHNOLOGY DEVELOPMENTS FOR LAMINAR BOUNDARY LAYER CONTROL ON SUBSONIC TRANSPORT AIRCRAFT
Richard D. Wagner, Dal V. Maddalon, and Michael C. Fischer *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 13 p refs Previously announced in IAA as A84-33137 (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01 CSCL 01A

N85-16788*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TURBULENT DRAG REDUCTION RESEARCH
D. M. Bushnell, J. B. Anders, M. J. Walsh, and R. V. McInville (North Carolina State Univ.) *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 13 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01 CSCL 01A

N85-16789*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON THE RELAXATION OF A TURBULENT BOUNDARY LAYER AFTER AN ENCOUNTER WITH A FORWARD FACING STEP
D. I. A. Poll and R. D. Watson (Cranfield Inst. of Tech., Bedford, England) *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 10 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01 CSCL 01A

N85-16792# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
SHOCK/TURBULENT BOUNDARY LAYER INTERACTION AND ITS CONTROL
Jean Delfry *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 41 p refs In FRENCH; ENGLISH summary (For primary

document see N85-16771 08-01)
Avail: NTIS HC A18/ MF A01

N85-16793# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
INTEREST OF INTERNAL BLEED FOR A TWO-DIMENSIONAL AIR INTAKE OPERATING IN A WIDE MACH NUMBER RANGE (1.8-3 PLUS)
G. Laruelle, C. Sans, and R. Lefebvre (Societe National Industrielle Aerospatiale, Chatillon, France) *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 10 p refs In FRENCH; ENGLISH summary (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16794# Centre d'Etudes Aerodynamiques et Thermiques, Poitiers (France).
OBLIQUE SHOCK WAVE-TURBULENT BOUNDARY LAYER INTERACTION ON A POROUS WALL WITH SUCTION [INTERACTION ONDE DE CHOC OBLIQUE: COUCHE LIMITE TURBULENTE SUR PAROI POREUSE AVEC ASPIRATION]
D. B. Lee and R. Leblanc *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 11 p refs In FRENCH (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16795# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
ACTIVE AND PASSIVE SHOCK/BOUNDARY LAYER INTERACTION CONTROL ON SUPERCRITICAL AIRFOILS
P. Thiede, P. Krogmann (Deutsch Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen, West Germany), and E. Stanewsky (Deutsch Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen, West Germany) *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 13 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16796# West Virginia Univ., Morgantown.
TRANSONIC SHOCK INTERACTION WITH A TANGENTIALLY-INJECTED TURBULENT BOUNDARY LAYER
G. R. Inger *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 10 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16978*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER ENTRY AERODYNAMICS
Robert C. Ried *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1051-1061 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 01A

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N85-16840# Federal Aviation Administration, Atlantic City, N.J.
PRELIMINARY EVALUATION OF AN IMPROVED FLAMMABILITY TEST METHOD FOR AIRCRAFT MATERIALS Final Report
Constantine P. Sarkos, Robert A. Filipczak, and Allan Abramowitz Dec. 1984 48 p refs
(FAA-CT-84-22) Avail: NTIS HC A03/MF A01

Small-scale flammability test methods were evaluated by comparing data obtained on a series of interior honeycomb panels with fire test results obtained with a 1/4-scale cabin model. Generally, the vertical Bunsen burner, limiting oxygen index, and radiant panel test methods ranked the phenolic-faced panels higher (better performance) than the epoxy-faced panels. It appears as if these test methods, which employ relatively moderate exposure conditions, are reflecting the superior ignition resistance of the phenolics over the epoxies. Thus, these tests cannot predict the performance of materials that exhibit high burning rates when subjected to heating conditions above their ignition threshold. The heating conditions used in the Ohio State University (OSU) apparatus, however, can be set at higher levels. At 5 watts/sq cm, rank ordering materials based on peak heat release rate measured via oxygen depletion in the OSU apparatus agreed with materials ranking in the 1/4-scale model. The OSU apparatus operated at these conditions and employing oxygen depletion calorimetry is the recommended improved fire test method for interior panels. Author

N85-16841*# Proteon Associates, Inc., Waltham, Mass.
RECOMMENDED IMPROVEMENTS FOR SECOND GENERATION 121.5/243 MHz ELT'S Final Report
William R. Wade and David Hall (Hall Research Associates, Inc.) Mar. 1983 65 p refs
(Contracts NAS5-26664; DOT-FA79WAI-002)
(NASA-CR-175274; NAS 1.26:175274) Avail: NTIS HC A04/MF A01 CSCL 09A

An off-the-shelf TSO-C91 qualified emergency locator transmitters (ELT) from each of five manufacturers was purchased and its electrical and mechanical design, including mounting bracket and installation instructions, were analyzed. These data are examined for possible correlation with ELT design and installation characteristics which are known from crash test data to affect ELT survival and operation in a crash, and recommendations are made. A remote control and monitor is recommended in order to reduce false alarms, and a laboratory tested fail-safe design for a standard interface is presented. Author

N85-16842# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
S-3A BALLAST BLOCK FINAL DESIGN AND ENGINEERING TESTS Final Report
D. Lorch and J. Quartuccio 22 Feb. 1984 50 p
(AD-A147685; NADC-84015-60) Avail: NTIS HC A03/MF A01 CSCL 01/3

The S-3A aircraft has four ejection seats. Both the pilot and copilot have comand eject selector levers which allow them the option to eject all crewmembers or self eject. If one of the aft seats is unoccupied, and command eject is selected, the unoccupied seat will accelerate ahead of the occupied seat next to it. Two hazards exist: (1) the crewmember next to the unoccupied seat could be burned by the rocket plume from the empty seat which has a higher acceleration; (2) the empty seat could tumble into one of the other seats because the center of gravity and the center of rocket thrust are too far apart. To eliminate these hazards it is necessary to ballast the unoccupied seat. This is presently being done with anthropomorphic test dummies, if they can be obtained. Unfortunately these dummies have various weights and are usually damaged. There is no guarantee that the center of gravity is in the proper location to prevent tumbling. To correct this potentially dangerous situation the naval air systems command tasked the naval air development center to design a ballast block. After the initial prototype was developed and tested, references (1) and (2) recommended changes to be incorporated into the final design. All of these recommendations have been incorporated into the final design. The S-3A ballast block is a 169 pound assembly of four interlocking aluminum blocks. It is used to control the trajectory of an unoccupied 1E-1 ejection seat. Tests indicate that it meets all functional and structural requirements for use in the S-3A aircraft. GRA

N85-16843# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Aerospace Medical Div.
IMPACT TESTS OF ADJUSTERS FOR THE HBU-12 LAP BELT Final Report, Oct. 1981 - Aug. 1984

Dale E. Schimmel and James W. Brinkley 26 Aug. 1984 53 p (AF Proj. 7231)
(AD-A148021; AFAMRL-TR-84-053) Avail: NTIS HC A04/MF A01 CSCL 13/12

Impact tests were performed to evaluate the adequacy of 1-3/4-in webbing adjusters proposed for the HBU-12 automatic lap belt. Four tests were conducted at impact levels ranging from 41.8 to 43.7 with impact velocities ranging from 84.9 to 86.7 ft/sec. The tests were accomplished using the Air Force Medical Research Lab's Horizontal Decelerator Facility with anthropometric dummy subjects. The adjusters were installed on the HBU-12 lap belt and tested with an MB-6 double shoulder harness. During the first impact test, the metal clevis of the shoulder harness failed at its attachment point; but the lap belt and adjusters successfully withstood the impact loads. The subsequent three tests were completely successful. GRA

N85-16844# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biomedical Protection Branch.
IMPACT TESTS OF AUTOMATIC LAP BELT CONFIGURATIONS Final Report, 10 Oct. 1981 - Jul. 1984
James W. Brinkley and Dale E. Schimmel 2 Jul. 1984 104 p (AF Proj. 7231)
(AD-A148034; AFAMRL-TR-84-041) Avail: NTIS HC A06/MF A01 CSCL 06/11

Sixteen impact tests of lap belt assemblies were performed to evaluate components for the HBU-X lap belt (now designated the HBU-12 lap belt). The lap belt assemblies were tested as part of a lap belt and shoulder harness configuration. Fifteen tests were conducted at a level of 40 G (mean = 40.2 G, S.D. =0.898) with an average impact velocity of 105.7 ft/sec (S.D. 0.976), The impact vector was applied in the -G(sub x) direction. The primary purpose of the tests was to evaluate the effectiveness of two different types of webbing adjusters. The influence of nylon, polyester, and latex-impregnated polyester was also studied. The results of the impact tests and several modes of failure including belt slippage through the adjusters and fractures of the metal attachment link of the MB-6 shoulder harness are described. Revision of design and test conditions are recommended. GRA

N85-16845# Ketron, Inc., Warminister, Pa.
A GENERALIZED ESCAPE SYSTEM SIMULATION (GESS) COMPUTER PROGRAM. VOLUME 2: GESS PROGRAMMER'S MANUAL, VERSION 2 Final Report
Louis A. DAulerio (Naval Air Development Center, Warminster, Pa.) and David A. Fender Apr. 1984 349 p
(Contract N62269-81-C-0206; NR Proj. 630-194)
(AD-A148363; NADC-84068-60) Avail: NTIS HC A15/MF A01 CSCL 09/2

The Generalized Escape System Simulation (GESS) program is a computerized mathematical model for dynamically simulating the performance of existing or developmental aircraft ejection seat systems. The program generates six-dimensional trajectory predictions of the aircraft, seat/occupant, occupant alone, and seat alone by calculating the forces and moments imposed on these elements by the seat catapults, rails, rockets, stabilization, and recovery systems included in most escape systems configurations. User options are provided to simulate the performance of all conventional escape system designs under most environmental conditions and aircraft attitudes or trajectories. This Gess Programmer's Manual, summarizes program conventions, lists the annotated FORTRAN IV program code, and represents the second of two volumes of GESS documentation. GRA

N85-16846# Civil Aeronautics Board, Washington, D.C.
AIRPORT ACTIVITY STATISTICS OF CERTIFICATED ROUTE AIR CARRIERS Annual Report, period ending 31 Dec. 1983
31 Dec. 1983 365 p
(AD-A148472) Avail: NTIS HC A16/MF A01; also available SOD HC $14.00 CSCL 01/5

This report furnishes airport activity of the Certificated Route Air Carriers. Included in the data contained in Table 6 are passenger enplanements, tons of enplaned freight, express, and mail. Both scheduled and non-scheduled service, and domestic and international operations are included. These data are shown by aircraft and carrier. Table 7 includes departures by airport, carrier and type of operation, and type of aircraft. Author (GRA)

N85-16847# Army Concepts Analysis Agency, Bethesda, Md.
UTILIZATION OF INCREASED AIRLIFT CAPABILITY (UIAC) STUDY Study Report, Apr. - Sep. 1984
J. A. Sorenson and J. DePalma Sep. 1984 272 p
(AD-A148669; CAA-SR-84-29) Avail: NTIS HC A12/MF A01 CSCL 15/5

This study examined the increases in peacetime airlift capacity due to the Military Airlift Command's fleet expansion, determined the impacts on the Army transportation system and developed a process to select the most suitable cargo and route combinations to use the additional capacity. The results of analysis indicated that transportation cost avoidances could be realized by diverting surface port-packed cargoes to airlift; however by increasing airlift resupply, potential cost savings could increase. Author (GRA)

N85-16848# Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany). Buero des Nachrichten fuer Luftfahrer.
DIRECTIONS OF THE WEST GERMAN MINISTRY OF TRANSPORT FOR EDUCATION AND CONTROL OF AIRLINE PERSONNEL (SECTION 3, CHAPTERS 2 AND 12) [RICHTLINIEN DES BUNDESMINISTERS FUER VERKEHR FUER DIE AUSBILDUNG UND PRUEFUNG DES LUFTFAHRTPERSONALS, TEIL 2, KAPITEL 2 UND 12]
Mar. 1983 75 p In GERMAN
Avail: NTIS HC A04/MF A01

The education curriculum of second class pilots is described. It consists of a theoretical part and a pratical part. The subjects are: air regulation and laws, air traffic and safety, navigation, weather forecasts, engineering, and reactions in special situations. Author (ESA)

N85-16849# Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany). Buero der Nachrichten fuer Luftfahrer.
DIRECTIONS OF THE WEST GERMAN MINISTRY OF TRANSPORT FOR EDUCATION AND CONTROL OR AIRLINE PERSONNEL, REPORT 6; CHAPTERS 3/A AND 3/B [VERKEHRSFLUGZEUGFUEHRER, DIE DIE ERLAUBNIS FUER BUNDESMINISTERS FUER VERKEHR FUER DIE AUSBILDUNG UND PRUEFUNG DES LUFTFAHRTPERSONALS, HEFT 6; KAPITEL 3A UND 3/B]
Apr. 1984 212 p In GERMAN
Avail: NTIS HC A10/MF A01

The education curriculum of commercial aircraft captains is described. It consists of a theoretical part and a practical part. The subjects are: air regulations and laws, air traffic and safety, navigation, weather forecasts, engineering, and reactions in special situations. Author (ESA)

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N85-16850 Department of the Air Force, Washington, D.C.
DUAL MODE RADIO FREQUENCY-INFRARED FREQUENCY SYSTEM Patent
C. T. Brumbaugh, R. L. Pittenger, and R. M. Klees, inventors (to Air Force) Issued 16 Oct. 1984 8 p Supersedes AD-D009772 (AD-D011402; US-Patent-4,477,814; US-Patent-Appl-SN-404096; US-Patent-Class-343-725) Avail: US Patent and Trademark Office CSCL 17/7

A combined RF/IR system in which a common surface is used for the dual modes of radiating and absorbing RF energy and of reflecting and focusing IR energy is discussed. The common surface is structured, configured, and used as the slotted array antenna for the RF energy and as the primary mirror of a Cassegrain optical subsystem for the IR energy. Author (GRA)

N85-16851# Committee on Commerce, Science, and Transportation (U. S. Senate).
SATELLITE NAVIGATION
Washington GPO 1984 58 p Hearing on S. Con. Res. 69 before the Subcomm. on Aviation of the Comm. on Com., Sci. and Transportation, 98th Congr., 2d Sess., 23 May 1984
(S-Hrg-98-856; GPO-35-977) Avail: Subcommittee on Aviation

Legislation is discussed which proposes making the civilian version of the global positioning system available to domestic airlines as well as to the commercial airlines of those countries which strictly abide by the spirit and letter of the International Air Services Transit Agreement. It is recommended that user fees not be imposed for either foreign or domestic users. The need for aircraft surveillance by satellite is examined as well as the inadequancy of current technologies. A.R.H.

N85-16852# Engineering and Economics Research, Inc., Falls Church, Va.
NATIONAL AIRSPACE REVIEW ENHANCEMENT PLAN, REVISION 3
19 Dec. 1984 64 p
Avail: NTIS HC A04/MF A01

The National Airspace Review (NAR) Plan was retitled as the National Airspace Review Enhancement (NARE) Plan to reflect the expanded scope of this undertaking. The airspace allocation, procedural, and regulatory aspects of improvements scheduled under the National Airspace System (NAS) plan and the shift of program sponsorship from the Associate Administrator for Air Traffic to the Director of Management Systems are reviewed. B.G.

N85-16853# Royal Signals and Radar Establishment, Malvern (England).
AIR TRAFFIC MANAGEMENT CONCEPTS FOR THE UK IN THE 1990'S: A REVIEW OF RECENT RSRE WORK
S.A. N. Magill and G. Ord Jun. 1984 26 p ref Presented at Eurocontrol Specialist Panel on Conflict Detection and Resolution (SPACDAR), Brussels, 21-23 Sep. 1983 Sponsored by Civil Aviation Authority
(AD-A147850; RSRE-MEMO-3714; BR93171) Avail: NTIS HC A03/MF A01 CSCL 17/7

Air traffic management and control in the United Kingdom in the 1990's is discussed. Metering of arriving traffic and departure management and control are considered. Author (ESA)

N85-16854# Royal Aircraft Establishment, Farnborough (England).
A DISCUSSION OF CONING ERRORS EXHIBITED BY INERTIAL NAVIGATION SYSTEMS
D. J. Flynn 12 Mar. 1984 22 p refs
(RAE-TM-RAD-NAV-243; BR92844) Avail: NTIS HC A02/MF A01

A mathematical theorem was used to classify and to account for the principal types of coning error in strapdown inertial navigators. It was used to quantify the likely magnitudes of coning errors for a typical system. It is found that coning effects induced by gyro dither can substantially degrade velocity performance of a 1 nm/hr inertial navigator. It is shown that large amplitude low frequency coning motion can also cause significant velocity errors if gyro orthogonality errors of the order of 6 arcsec are present. Ways of assessing the effect of coning errors are suggested and methods for reducing their effect are outlined. Author (ESA)

N85-16855# Federal Aviation Agency, Atlantic City, N.J.
NATIONAL AIRSPACE REVIEW Interim Report
Jun. 1984 101 p
(AD-A147768) Avail: NTIS HC A06/MF A01 CSCL 17/7

Since the summer of 1982, the Federal Aviation Administration (FAA) has been hosting task group working sessions of the National Airspace Review (NAR). The NAR is a cooperative venture by the aviation industry and government. The NAR is comprehensively reviewing current air traffic control procedures, flight regulations, and airspace for the purpose of validating the current system or identifying near-term changes which will promote greater efficiency. As a component of the National Airspace System Plan, the NAR will provide the operational framework for moving into the next generation National Airspace System (NAS). In the area of procedures, task groups have covered: terminal services, weather programs, traffic flow management, helicopter operations, separation standards and the National Flight Data System. GRA

N85-16856# Naval Postgraduate School, Monterey, Calif.
INSTALLATION OPTIONS FOR THE NAVSTAR GLOBAL POSITIONING SYSTEM IN SURFACE SHIPS M.S. Thesis
K. S. Amos Jun. 1984 56 p
(AD-A148190) Avail: NTIS HC A04/MF A01 CSCL 17/7

The NAVSTAR Global Positioning System (GPS) is a space based navigation system. This system is scheduled to be installed in a variety of military platforms. The receiver system for GPS will be installed in US Navy surface ships between 1989 and 1996. This thesis compares three alternative methods of completing this installation program: (1) installation during a ships regularly scheduled overhaul, (2) installation by a special team of technicians, and (3) installation by the ships' assigned personnel. The strength and weaknesses of each method are discussed. A recommendation of installation during regular overhaul is made. Author (GRA)

N85-16857# Gyroart, Inc., Agoura, Calif.
LOW COST GYROCOMPASS Final Report, Oct. 1983 - May 1984
J. F. Kishel Jun. 1984 42 p
(Contract DAAK70-83-C-0168)
(AD-A148295; GYR-001; ETL-0355) Avail: NTIS HC A03/MF A01 CSCL 17/7

This report summarizes study and analysis efforts that were directed towards using gyrotechnology to define true north to an accuracy of 2 milliradians in two minutes' time in the presence of vibration environments encountered on launch vehicles. It concludes that a device could be fabricated to meet stated requirements by using a design approach that avoids the dynamics problems inherent in all pendulous suspensions for the gyro. GRA

N85-16858# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
RECENT DEVELOPMENT IN ASTRONOMIC POSITION DETERMINATIONS Final Report
R. D. Rowe, R. Salvermoser, E. A. Howell, and J. H. Raum 25 Oct. 1984 38 p Presented at the Am. Geophys. Union (AGU) Fall Meeting, 3-7 Dec. 1984, San Francisco
(AD-A148335) Avail: NTIS HC A03/MF A01 CSCL 08/5

An advanced engineering model of an electro-optical star sensor system designed by Ball Aerospace Systems Division, incorporates a charge injection device (CID) detector having a 256 x 256 pixel array. The system is integrated with a Wild T-4 astronomic theodolite in the focal plane to replace the human eye. A star image is acquired and tracked across detector pixels to determine a time versus meridian angle intercept that is synchronized with a very accurate time. Zenith angle intercepts are also measured. Track position, interpolation, and data reduction algorithms are derived and incorporated into the system software to provide astronomic latitude and longitude to about + or - 0.1 arc second (1 sigma). This system is being built for the Defense Mapping Agency under an on-going technical development program to improve the accuracy of astronomic position determinations. The need for accuracy improvements, the limitations of conventional instruments, an analysis of major error sources, the results of previous developmental efforts, and the design and use of advanced production instruments are also presented.
Author (GRA)

N85-16859# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
TESTING OF A FIELD PORTABLE GPS (GLOBAL POSITIONING SYSTEM) GEODETIC RECEIVER Final Report
John W. Rees, Patrick Fell, Richard J. Anderle, Michael Sims, Bruce R. Hermann, James Clynch (Texas Univ., Austin), Arnold Tucker (Texas Univ., Austin), and Alan G. Evans Nov. 1984 22 p Presented at PLANS' 84, 22-27 Nov. 1984, San Diego, CA Prepared in cooperation with Naval Surface Weapons Center, Dahlgren, Va.
(AD-A148336) Avail: NTIS HC A02/MF A01 CSCL 08/5

DMA, in cooperation with the USGS and NOAA, is sponsoring the development of a Global Positioning System geodetic receiver which is capable of observing up to four satellites simultaneously by sampling segments of broadcast signals from different satellites in a time-mulitplexing sense using a simple dual frequency channel. The receiver system was designed to measure the geodetic coordinates of points to an accuracy of one meter and to provide first-order estimates of baselines of up to several hundred kilometers in length. In addition, the receiver can support positioning and attitude determination of geophysical survey platforms under low dynamic conditions. Four receiver units have been used in extensive laboratory and field tests. Static positioning tests were designed to determine system performance. These tests have provided data for analysis of point and relative positioning over baselines between 30 meters and 100 kilometers in length. Another series of dynamic tests was designed to evaluate system performance in varying dynamic environments. Tests at the Yuma Proving Ground, AZ, used both a jeep and helicopter as platforms, with a laser positioning system for dynamic reference. Tests by the Naval Oceanographic Office in Bay St. Louis, MS, used a 36-foot motor launch as a platform, with a set of trisponders used as the reference system. GRA

N85-16860# Institut fuer Rundfunktechnik, Munich (West Germany).
MEASUREMENT OF SIGNAL SEPARATION BETWEEN RADIO SERVICE AND AIR NAVIGATION SERVICE [SCHUTZABSTAND-SMESSUNGEN ZWISCHEN RUNDFUNKDIENST UND FLUGNAVIGATIONSFUNK DIENST]
E.-J. Mielke 17 May 1982 21 p ref In GERMAN
(IRT-TB-B-40/82) Avail: NTIS HC A02/MF A01

Interference between the frequency range for the air navigation service (108 to 112 MHz) and the VHF-FM-radio range 8, which was recently extended to 108 MHz, was studied. Pertubation of the Instrument Landing System was considered. The signal separation was measured with an aircraft ILS receiver. The required signal separation is presented as a function of the frequency distances of disturbing radio stations. Author (ESA)

N85-16802# Department of National Defence, Ottawa (Ontario).
DEVELOPMENT OF A HELICOPTER INTEGRATED NAVIGATION SYSTEM
D. F. Liang, W. R. Clubine, L. C. Vallot (Honeywell Systems and Research Center, Minneapolis, Minn.), and J. K. Mahesh (Honeywell Systems and Research Center, Minneapolis, Minn.) *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 19 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16803# Standard Elektrik Lorenz A.G., Stuttgart (West Germany).
HIGH ACCURACY DOPPLER NAVIGATION EMPLOYING OPTIMUM INTEGRATED POSITION FIX INFORMATION
H. Hug *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 8 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16804# Naval Air Development Center, Warminster, Pa.
STANDARD ATTITUDE HEADING REFERENCE SYSTEM (SAHRS) FULL SCALE DEVELOPMENT PROGRAM
Kenton L. Bachman *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 12 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16901*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE NAVIGATION STATUS
Emil R. Schiesser *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 102-112 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 17G

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.
For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N85-16861*# Lockheed-California Co., Burbank.
INTEGRATED DIGITAL/ELECTRIC AIRCRAFT CONCEPTS STUDY Contractor Report, Oct. 1983 - Sep. 1984
M. J. Cronin, A. P. Hays, F. B. Green, N. A. Radovcich, C. W. Helsley, and W. L. Rutchik Washington NASA Jan. 1985 464 p refs
(Contract NAS1-17529)
(NASA-CR-3841; NAS 1.26:3841; LR-30704) Avail: NTIS HC A20/MF A01 CSCL 01C

The integrated digital/electrical aircraft (IDEA) is an aircraft concept which employs all electric secondary power systems and advanced digital flight control systems. After trade analysis, preferred systems were applied to the baseline configuration. An additional configuration, the alternate IDEA, was also considered. For this concept the design ground rules were relaxed in order to quantify additional synergistic benefits. It was proposed that an IDEA configuration and technical risks associated with the IDEA systems concepts be defined and the research and development required activities to reduce these risks be identified. The selected subsystems include: power generation, power distribution, actuators, environmental control system and flight controls systems. When the aircraft was resized, block fuel was predicted to decrease by 11.3 percent, with 7.9 percent decrease in direct operating cost. The alternate IDEA shows a further 3.4 percent reduction in block fuel and 3.1 percent reduction in direct operating cost.
R.S.F.

N85-16862*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STUDY OF WINGLETS APPLIED TO BIPLANES
Peter D. Gall and Hubert C. Smith (Pennsylvania State Univ.) Jan. 1985 21 p refs Presented at the 23rd AIAA Aerospace Sci. Meeting, Reno, Nev., 14-17 Jan. 1985 Submitted for publication (NASA-TM-86350; NAS 1.15:86350; AIAA-85-0279) Avail: NTIS HC A02/MF A01 CSCL 01C

The possibility of improving the aerodynamic characteristics of a biplane configuration by adding winglets is examined both theoretically and experimentally. Theoretical calculations show good agreement with experiment in predicting inviscid drag due to lift. Theoretical and experimental results indicate that the addition of winglets to an optimized biplane configuration can increase the ideal efficiency factor by up to 13 percent, as well as increasing the lift curve slope and maximum lift coefficient. B.W.

N85-16863*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NUMERICAL ANALYSIS OF THE FIRST STATIC CALIBRATION OF THE RSRA HELICOPTER ACTIVE-ISOLATOR ROTOR BALANCE SYSTEM
C. W. Acree, Jr. Feb. 1985 60 p refs
(NASA-TM-85975; A-9795; NAS 1.15:85975) Avail: NTIS

HC A04/MF A01 CSCL 01C

The helicopter version of the Rotor Systems Research Aircraft (RSRA) is designed to make simultaneous measurements of all rotor forces and moments in a manner analogous to a wind-tunnel balance. Loads are measured by a combination of load cells, strain gages, and hydropneumatic active isolators with built-in pressure gages. Complete evaluation of system performance requires calibration of the rotor force- and moment-measurement system when installed in the aircraft. Derivations of calibration corrections for various combinations of calibration data are discussed. Author

N85-16864# Army Aviation Engineering Flight Activity, Edwards AFB, Calif.

AIRWORTHINESS AND FLIGHT CHARACTERISTICS TEST OF THE RC-12D GUARDRAIL V Final Report, 10 May - 1 Jun. 1984

George M. Yamakawa, James L. Webre, Richard S. Adler, and Ronald E. Ratcliff Jul. 1984 73 p
(AF Proj. 8402)
(AD-A148046; AD-E850735; USAAEFA-84-02) Avail: NTIS HC A04/MF A01 CSCL 01/2

The US Army Aviation Engineering Flight Activity conducted a limited Airworthiness and Flight Characteristics test of the RC-12D (Improved Guardrail V) aircraft with both standard and infrared (IR) suppressor exhaust stacks installed from 10 May though 1 June 1984 at Wichita, Kansas. During the test program, 12 flights were conducted for a total of 25.7 hours, of which 14.6 were productive. All tests were performed in a normal mission configuration ballasted to a maximum takeoff gross weight of 14,200 pounds and a center of gravity at fuselage station 190.1 (fwd). Test results were compared with data obtained during previous testing, and evaluated against military specification MIL-F-8785C. Takeoff and landing performance presented in the operator's manual were confirmed as was the Beech Aircraft Corporation provided drag polar plot of the standard stack configured aircraft. A slight degradation in performance was noted with IR suppressor exhaust stacks installed. The RC-12D aircraft has marginal climb performance capabilities with a combat ceiling below 24,000 feet density altitude. The handling qualities of the RC-12D with both standard and IR suppressor exhaust stacks installed were essentially unchanged from the standard C-12D aircraft with the exception of improved stall characteristics. GRA

N85-16865# Army Aviation Engineering Flight Activity, Edwards AFB, Calif.

PRELIMINARY AIRWORTHINESS EVALUATION AH-1S (MC) HELICOPTER WITH EXTERNAL FUEL TANKS INSTALLED Final Report, 17 Mar. - 27 Apr. 1984

J. I. Nagata, J. S. Voss, and R. A. Williams Jul. 1984 93 p
(AD-A148091; USAAEFA-84-09) Avail: NTIS HC A05/MF A01 CSCL 01/3

The Preliminary Airworthiness Evaluation of the AH-1S Modernized Cobra, (S/N 69-16423) with the Kellett ferry tanks installed was conducted at Edwards Air Force Base, California (2302 feet) and Bakersfield, California (488 feet). Approximately 19 productive hours were flown during 24 flights between 17 March and 27 April 1984. The Kellett ferry tanks increased the equivalent flat plate area by 2.0 sq ft. One deficiency noted during the evaluation was the lack of crashworthiness of the external fuel tanks. Four shortcomings associated with the installation of the external fuel tanks were found. GRA

N85-16866# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.

A DESCRIPTION OF A LOGISTICALLY IDEAL AIRCRAFT M.S. Thesis

J. O. Campbell and J. D. Carlin Sep. 1984 84 p
(AD-A148425; AFIT/GSM/LSY/84S-5) Avail: NTIS HC A05/MF A01 CSCL 01/3

The purpose of this thesis was to develop a description of a logistics ideal aircraft. A survey was conducted of senior Air Force logisticians and distinguished civilian logisticians. The Delphi methodology was used to elicit expert opinion concerning major logistics problems in current generation aircraft and ways to avoid these problems in future generation aircraft. These problems and solutions were used to describe the logistics ideal aircraft. GRA

N85-16867# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

OPTIMUM PERFORMANCE PARAMETERS FOR SKI-JUMP OPERATIONS OF USAF FIGHTER AIRCRAFT

J. J. Olsen Aug. 1984 42 p
(AF Proj. 2401)
(AD-A148532; AFWAL-TM-84-217-FIB) Avail: NTIS HC A03/MF A01 CSCL 01/2

This paper discusses the equations of motion which govern the aerodynamic performance of USAF fighter aircraft immediately after ski-jump takeoffs. By a careful selection of coordinate systems and independent and dependent variables, we eliminate the need for repetitive time-history integration of the nonlinear, coupled equations. This allows a relatively simple, but exact solution of the problem. Detailed results are presented for the F-4, A-10, F-15 and F-16 for two cases -- a nominal baseline for constant pitch attitude, and a best possible case which produces the lowest achievable takeoff speeds. Author (GRA)

N85-16766# Joint Publications Research Service, Arlington, Va.

TESTING SOLUTION FOR IL-76 BRAKING SYSTEM PROBLEM

V. Lamzutov *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 6-8 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 30 Aug. 1984 p 3 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

N85-16768# Joint Publications Research Service, Arlington, Va.

DESIGNER ON CIVIL AIRCRAFT DESIGN TRENDS IN USSR

S. Yeger *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 14-17 Transl. into ENGLISH from Nedelya (Moscow), no. 33, 13-19 Aug. 1984 p 12-13 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

N85-16769# Joint Publications Research Service, Arlington, Va.

IMPROVED SPRAYER FOR AN-2 CROPDUSTING WORK

A. Sobachkina *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 18-19 Transl. into ENGLISH from Vozdushnny Transp. (Moscow), 25 Sep. 1984 p 2 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

N85-16777# National Aerospace Lab., Amsterdam (Netherlands).

DESIGN OF AN AIRFOIL LEADING EDGE SLAT USING AN INVERSE AERODYNAMIC CALCULATION METHOD

J. A. vanEgmond and B. vandenBerg *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 11 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16780# Boeing Military Airplane Development, Seattle, Wash.

AERODYNAMIC ISSUES IN THE DESIGN OF HIGH-LIFT SYSTEMS FOR TRANSPORT AIRCRAFT

Bertil Dillner, Fred W. May, and John H. McMasters *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 22p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16781# De Havilland Aircraft Co. of Canada Ltd., Downsview (Ontario).

AN UPDATE OF THE CANADA/USA AUGMENTOR-WING PROJECT

D. C. Whittley *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 8 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16782# Lockheed-Georgia Co., Marietta. Advanced Flight Sciences.
AIRCRAFT DRAG REDUCTION TECHNOLOGY
Andrew S. W. Thomas *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and high Lift Systems Aug. 1984 20p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16786# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
DESIGN STUDIES OF THICK LAMINAR FLOW AIRFOILS FOR LOW SPEED FLIGHT EMPLOYING TURBULENT BOUNDARY LAYER SUCTION OVER THE REAR PART
J. L. vanIngen, J. J. H. Blom, and J. H. Goei *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 19 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16790*# Aeronautical Research Inst. of Sweden, Bromma.
FULL SCALE EXPERIMENTS INTO THE USE OF LARGE EDDY BREAKUP DEVICES FOR DRAG REDUCTION ON AIRCRAFT
Arild Bertelrud *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 16 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16791# Technische Hogeschool, Delft (Netherlands).
PNEUMATIC TURBULATORS: A DEVICE FOR DRAG REDUCTION AT REYNOLDS NUMBERS BELOW 5 MILLION
K. H. Horstmann, A. Quast, and L. M. M. Boermans *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 19 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16818# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
FLIGHT TESTS WITH A NEW HELICOPTER FORCE FEEL SYSTEM (FFS)
R. D. vonReth, H. Koenig, and G. Turck *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 11 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N85-16868*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REFERENCE ENERGY-ALTITUDE DESCENT GUIDANCE: SIMULATOR EVALUATION
Kathy H. Abbot and Charles E. Knox Jan. 1985 39 p refs
(NASA-TP-2383; L-15800; NAS 1.60:2383) Avail: NTIS HC A03/MF A01 CSCL 01D

Descent guidance was developed to provide a pilot with information to ake a fuel-conservative descent and cross a designated geographical waypoint at a preselected altitude and airspeed. The guidance was designed to reduce fuel usage during the descent and reduce the mental work load associated with planning a fuel-conservative descent. A piloted simulation was conducted to evaluate the operational use of this guidance concept. The results of the simulation tests show that the use of the guidance reduced fuel consumption and mental work load during the descent. Use of the guidance also decreased the airspeed error, but had no effect on the altitude error when the designated waypoint was crossed. Physical work load increased with the use of the guidance, but remained well within acceptable levels. The pilots found the guidance easy to use as presented and reported that it would be useful in an operational environment. Author

N85-16869*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A COCKPIT-DISPLAY CONCEPT FOR EXECUTING A MULTIPLE GLIDE-SLOPE APPROACH FOR WAKE-VORTEX AVOIDANCE
Terence S. Abbott Feb. 1984 44 p refs
(NASA-TP-2386; L-15852; NAS 1.60:2386) Avail: NTIS HC A03/MF A01 CSCL 01D

A piloted simulation study was undertaken to determine the feasibility of utilizing a forward-looking display to provide information that would enable aircraft to rredue their in-trail separation interval, and hence increase airport capacity, through the application of multiple glide-path approach techniques. The primary objective of this study was to determine whether information could be satisfactorily provided on a head-up display (HUD) format to permit the pilot to conduct a multiple glide-slope approach while maintaining a prespecified in-trail separation interval. The tests were conducted in a motion-base cockpit simulator configured as a current-generation transport aircraft and included dynamic effects of the vortices generated by the lead aircraft. The information provided on the HUD included typical aircraft guidance information and the current and past positions of the lead aircraft. Additionally, the displayed information provided self-separation cues that allowed the pilot to maintain separation on the lead aircraft. Performance data and pilot subjective ratings and comments were obtained during the tests. The results of this study indicate that multiple glide-slope approaches, procedurally designed for vortex avoidance, are possible while maintaining pilot work load and performance within operationally acceptable limits. In general, it would seem that multiple glide-slope approaches are possible even under reduced in-trail separation conditions if the pilot is provided with adequate situational information. Author

N85-16870# Royal Aircraft Establishment, Farnborough (England).
ON-BOARD PROCESSING FOR LINESCAN SENSORS IN MINIATURE UNMANNED AIRCRAFT
J. A. C. Beattie 10 Jan. 1984 21 p refs
(RAE-TM-SPACE-327; BR91753) Avail: NTIS HC A02/MF A01

The characteristics of linescan imagery are identified, and for those suitable for on-board processing in unmanned aircraft, the parameters and limits of operation are shown. Bandwidth reduction and information extraction may be enhanced or supplemented by on-board processing to prefilter the data for target detection and target motion detection. Full use of automatic target detection can only be made in conjunction with a navigation system to give ground coordinates for the target data. Alternatively, navigation and air vehicle attitude data can be obtained from the on-board linescan image processor, given the appropriate sensor and processing algorithms. Author (ESA)

N85-16871# Rohde and Schwartz, Munich (West Germany). Unternehmensbereich Betriebsfunktechnik.
DEVELOPMENT, PRODUCTION AND TESTING OF CENTRAL CONTROL AND DISPLAY UNIT FOR HELICOPTERS Final Report, Dec. 1983
Wolfgang Brueckner Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 54 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-84-039; ISSN-0170-1339) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11

Central control of avionics systems is discussed. The individual control units monitoring avionics systems integrated in helicopters were replaced by a microprocessor controlled central control and display unit consisting of an alphanumeric display, a keypad for the entry of characters as well as softkeys for selecting the operating modes. A program was developed according to an

operational philosophy complying with human engineering requirements. The unit was tested in flight and shows good results.
Author (ESA)

N85-16872# VDO-Luftfahrtgeraete Werk Adolf Schindling G.m.b.H., Frankfurt (West Germany). Bereich Luftfahrt.
REALIZATION AND TESTING OF AN EXPERIMENTAL COLOR DISPLAY SYSTEM FOR GENERAL AVIATION HELICOPTERS AND AIRCRAFT Final Report, Apr. 1984
Hans Werner Fischer, Matthias Grosskopf, and Reinhard Schoennagel Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 67 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie (BMFT-FB-W-84-042; ISSN-0170-1339) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14

An experimental color display system, consisting of a 5 x 5 in monitor with cathode ray tube and a computer/symbol generator, was built and installed in a BO 105 helicopter for testing. The equipment was developed by modification of the cockpit components of the Airbus A 310 in order to reduce costs. For the tests all indicators required for flight were integrated in a compact and comprehensive way in one display. Owing to the good results of the tests with one display, the system was extended (hardware and software) by a second display for presenting all engine data.
Author (ESA)

N85-16799# Ferranti Ltd., Edinburgh (Scotland). Navigation Systems Dept.
AUTOMATIC BRIEFING AND MISSION MANAGEMENT SYSTEMS FOR BATTLEFIELD SUPPORT
C. G. W. Roads *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 6 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16800# Anacapa Sciences, Inc., Santa Barbara, Calif.
A COMPUTER-GENERATED TOPOGRAPHIC DISPLAY SYSTEM FOR NAVIGATION AND MISSION PLANNING IN HELICOPTERS
Steven P. Rogers *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 11 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16801# Thomson-CSF, Issy les Moulineaux (France).
MAP DISPLAY FOR HELICOPTERS
Pierre Cholle *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 16 p refs In ENGLISH and FRENCH (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16805# Racal Avionics Ltd., New Malden (England).
INTEGRATED CONTROL AND DISPLAY SYSTEMS FOR HELICOPTER BATTLEFIELD MISSION MANAGEMENT
Martin A. Richardson *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 7 p (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16806# Societe de Fabrication d'Instruments de Mesure, Massy (France).
A DIGITAL PILOTING SYSTEM FOR THE COMBAT HELICOPTER [SYSTEME NUMERIQUE DE PILOTAGE POUR HELICOPTERE DE COMBAT]
J. C. Derrien *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 13 p refs In FRENCH (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16808# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
EVALUATION OF NOSE, ROOF, AND MAST MOUNTED SENSOR PLATFORMS FOR PILOTING AND SIGHTING, INTEGRATED IN FUTURE COMBAT HELICOPTERS
H.-D. V. Boehm and R. D. v. Reth *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 16 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16809# Crouzet Aerospace and Systems, Valence (France).
RECENT METHODS FOR CALIBRATING THE ANEMOMETRY OF HELICOPTERS AT LOW SPEEDS [NOVELLES METHODES D'ETALONNAGE DE L'ANEMOMETRIE DES HELICOPTERES AUX BASSES VITESSES]
J. Mandle *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 12 p refs In FRENCH (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16811# Westland Helicopters Ltd., Yeovil (England).
THE DESIGN AND DEVELOPMENT OF AN INTEGRATED CORE SYSTEM FOR BATTLEFIELD HELICOPTERS
S. D. Roy and P. L. Shillito *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 10 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16812# Army Avionics Research and Development Activity, Fort Monmouth, N. J.
EVOLUTION TOWARD A MULTI-BUS ARCHITECTURE FOR ARMY HELICOPTER AVIONIC SYSTEMS
Joseph A. Dasaro *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 7 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16813# Bell Helicopter Co., Fort Worth, Tex.
INTEGRATION OF SENSOR FUSION IN ADVANCED HELICOPTER COCKPIT DESIGN
George L. Cohill, Dora D. Strother, and Harold B. Henderson (Texas Instruments, Dallas, Tex.) *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 9 p (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16820# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
FLIGHT RESEARCH ON VISUSL AIDS AND NAVIGATION EQUIPMENT FOR HELICOPTER LOW-LEVEL FLIGHT AT NIGHT
Ralf Beyer *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 8 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16821*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT AND FLIGHT TEST OF A HELICOPTER COMPACT, PORTABLE, PRECISION LANDING SYSTEM CONCEPT
John S. Bull, George R. Clary, Thomas J. Davis, and John P. Chisholm (Sierra Nevada Corp., Reno) *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 8 p refs Previously announced as N84-24566 (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01 CSCL 01D

N85-16890*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EVOLUTION OF SHUTTLE AVIONICS REDUNDANCY MANAGEMENT/FAULT TOLERANCE
Jack C. Boykin, Joseph R. Thibodeau, and Henry E. Schneider (McDonnell-Douglas Technical Services Co., Houston, Tex.) *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 1-18 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

N85-16891*# Honeywell, Inc., Clearwater, Fla.
SHUTTLE AVIONICS SOFTWARE TRIALS, TRIBULATIONS AND SUCCESS
O. L. Henderson *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 19-29 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

N85-16892*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE AVIONICS SOFTWARE DEVELOPMENT TRIALS: TRIBULATIONS AND SUCCESSES, THE BACKUP FLIGHT SYSTEM
Edward S. Chevers *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 30-37 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

N85-16896*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DEVELOPMENT AND IMPLEMENTATION OF THE VERIFICATION PROCESS FOR THE SHUTTLE AVIONICS SYSTEM
H. E. Smith, W. B. Fouts (Rockwell International Corp., Downey, Calif.), and J. Mesmer (Rockwell International Corp., Downey, Calif.) *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 64-75 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

N85-16899*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
INTEGRATED DESIGN CHECKOUT OF SHUTTLE PAYLOAD AVIONICS INTERFACES
John F. Muratore and Kathy K. Whitcomb *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 87-96 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

N85-16912*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE ORBITER AIR DATA SYSTEM
Ernest R. Hillje *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 313-324 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

N85-16936*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
HISTORY, DESIGN AND PERFORMANCE OF THE SPACE SHUTTLE HAZARDOUS GAS DETECTION SYSTEM
Willam R. Helms *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt.1 Jan. 1985 p 573-580 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

N85-16938*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PROPULSION AND POWER SYSTEMS PERSPECTIVE
Joseph G. Thibodaux, Jr. *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 581-584 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 21H

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N85-16873*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
MULTIVARIABLE FLIGHT CONTROL WITH TIME-SCALE SEPARATION
Karl Haiges May 1984 144 p refs
(Grant NGL-22-009-124)
(NASA-CR-174320; NAS 1.26:174320; LIDS-TH-1381) Avail: NTIS HC] A07/MF A01 CSCL 20E

The design of a compensator to provide a multivariable closed-loop, feedback control system with bandwidth separated input-output groups is considered. The basic contribution is to analyze, improve, and illustrate the programmatically used closed-one-loop at-a-time design procedure and to investigate the attainable performance and robustness properties. The design example used is the AV-8A Harrier aircraft. The underlying philosophy employed in the Linear Quadratic Gaussian with Loop Transfer Recovery (LOG/LTR) design methodology. Author

N85-16874# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
THE APPLICATION OF A TECHNOLOGY INDEX TO AIRCRAFT TURBINE ENGINE COST ESTIMATING RELATIONSHIPS M.S. Thesis
W. P. Simpson, III and J. R. Sims, Jr. Sep. 1984 102 p
(AD-A147701; AFIT/GSM/LSY/84S-25) Avail: NTIS HC A06/MF A01 CSCL 14/1

This research attempts to develop a technological index based on selected characteristics of new products. The methodology employed to develop the index was adopted from the technological forecasting community, where it is accepted as a valid technique for quantifying technological change. Several indices were developed to measure the level of technology incorporated into the design and development of aircraft turbine engines. Each index was based on a different assumption about the expected time path of technological growth. The data set was restricted to the same engines used by Rand to develop a set of cost estimating relationships (CERs) for estimating the development cost to model qualification tests, production cost, and the total development cost of jet engines. Selected indices were then introduced into the Rand CERs to evaluate their impact as cost drivers and their relationship to the other variables in the equations. The application resulted in the technology indices being significant and valid cost drivers. GRA

N85-16875# Rolls-Royce Ltd., Derby (England).
THE AIRCRAFT ENGINE OF THE FUTURE
J. F. Coplin 10 Sep. 1984 37 p Presented at British Assoc. for the Adv. of Sci., Norwick, England 10-14 Sep. 1984
(PNR-90226) Avail: NTIS HC A03/MF A01

Quieter, simpler, and more efficient aircraft engines designed using computers, and built in automated factories, are predicted. Ceramic blades and mixed flow compressors are discussed.
Author (ESA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N85-16876 Purdue Univ., Lafayette, Ind.
TIME SERIES ANALYSIS OF CLOSED-LOOP PILOT VEHICLE DYNAMICS Ph.D. Thesis
Daniel John Biezad 1984 275 p
Avail: Univ. Microfilms Order No. DA8423330

The off line development of linear discrete autoregressive models for man machine closed loop flight performance is presented. The development includes single input, single output (single channel) and multiple input, multiple output (multichannel) closed loop systems. Previous research is consolidated by

extensive surveys of both single and multichannel closed loop modeling and is extended into a comprehensive joint autoregressive man machine identification process. In single channel closed loop tracking tasks, pilot manual control is modeled in terms of linear discrete transfer functions which are parsimonious and guaranteed staple. The transfer functions are found by applying a modified superposition time series generation technique to relatively short data records, approximately 25 seconds long. The resulting model is then validated and analyzed. Results from a piloted laboratory simulation of single and double integrator controlled elements (longitudinal axis) agree with previous research findings. The development of the multichannel identification process is also described. Dissert. Abstr.

N85-16877*# Systems Technology, Inc., Mountain View, Calif.
MISSION-ORIENTED REQUIREMENTS FOR UPDATING MIL-H-8501. VOLUME 1: STI PROPOSED STRUCTURE Final Report
Warren F. Clement, Roger H. Hoh, Samuel W. Ferguson, III, David G. Mitchell, Irving L. Ashkenas, and Duane T. McRuer Jan. 1985 150 p refs 2 Vol.
(Contract NAS2-11304)
(NASA-CR-177304-Vol-1; NAS 1.26:177304-Vol-1; USAAVSCOM-TR-84-A-6; STI-TR-1194-1-1) Avail: NTIS HC A07/MF A01 CSCL 01C

The structure of a new flying and ground handling qualities specification for military rotorcraft is presented. This preliminary specification structure is intended to evolve into a replacement for specification MIL-H-8501A. The new structure is designed to accommodate a variety of rotorcraft types, mission flight phases, flight envelopes, and flight environmental characteristics and to provide criteria for three levels of flying qualities, a systematic treatment of failures and reliability, both conventional and multiaxis controllers, and external vision aids which may also incorporate synthetic display content. Existing and new criteria were incorporated into the new structure wherever they could be substantiated. R.S.F.

N85-16878*# Systems Technology, Inc., Mountain View, Calif.
MISSION-ORIENTED REQUIREMENTS FOR UPDATING MIL-H-8501. VOLUME 2: STI BACKGROUND AND RATIONALE Final Report
Warren F. Clement, Roger H. Hoh, David G. Mitchell, and Samuel W. Ferguson, III Jan. 1985 113 p refs 2 Vol.
(Contract NAS2-11304)
(NASA-CR-177304-Vol-2; NAS 1.26:177304-Vol-2; USAAVSCOM-TR-84-A-6; STI-TR-1194-1-2) Avail: NTIS HC A06/MF A01 CSCL 01C

A supplement to the structure of a new flying and ground handling qualities specification for military rotorcraft structure is presented in order to explain the background and rationale for the specification structure, the proposed forms of criteria, and the status of the existing data base. Critical gaps in the data base for the new structure are defined, and recommendations are provided for the research required to address the most important of these gaps. R.S.F.

N85-16879# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
DESIGN OF A DIGITAL RIDE QUALITY AUGMENTATION SYSTEM FOR COMMUTER AIRCRAFT Ph.D. Thesis, Kansas Univ.
Terry A. Hammond 1984 379 p
(AD-A148233; AFIT/CI/NR-84-84D) Avail: NTIS HC A17/MF A01 CSCL 01/4

This project was initiated based on the goal of making the ride of the commuter aircraft as smooth as the ride experienced on the major commercial airliners. The objectives of this project were to design a digital, longitudinal mode ride quality augmentation system (RQAS) for a commuter aircraft, and to investigate the effect of selected parameters on those designs. The initial stage of this research was the development of an interactive control augmentation design (ICAD) program for use in the design and evaluation of the candidate RQASs. This computer aided design program included both optimal and classical design approaches for either continuous or digital systems, and provided data for analyses in both the time and frequency domains. Both optimal and classical RQAS designs were generated for the five flight conditions selected as representative of a typical commuter mission, using a Cessna 402B. These RQASs used direct lift flaps and the elevator for control of the longitudinal accelerations. The design parameters selected include the sample time, computation delay time, servo bandwidth, and the flap and elevator control power. Optimal and classical point designs, based on the nominal design parameters, are presented for all five flight conditions. Parametric analyses for all five flight conditions for both the optimal and classical designs are also presented. GRA

N85-16880# Naval Research Lab., Washington, D. C.
USING THE CONTROL SYSTEM DESIGN ENVIRONMENT IN THE DESIGN OF A DATA LINK RECEIVER UNIT FOR THE COAST GUARD HH-65A HELICOPTER M.S. Thesis
F. S. Fox Jun. 1984 166 p
(AD-A148624) Avail: NTIS HC A08/MF A01 CSCL 17/2

This thesis is an attempt to prove the value of the Control System Design Environment by designing a shipboard or ground-based data link receiver to communicate with the data link installed in the Coast Guard HH-65A helicopter. The Control System Design Environment was intended to allow a designer to use a high-level language to describe the required inputs and outputs of a system. This high-level language, the Control System Design Language (CSDL) is translated into a list of primitives by a Pascal program, CSDL.PAS. The primitive list is then compiled into assembly language by a FORTRAN program, NEWCSDL.FOR. The final output includes the hardware and software lists to build a controller that meets the designer's specifications. This particular project includes a project design much more ambitious than any previously attempted in the Control System Design Environment.
Author (GRA)

N85-16881# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
FLIGHT TEST OF THE OPEN LOOP GUST ALLEVIATION (OLGA) SYSTEM Final Report, Dec. 1983
Hartmut Boehret, Hubertus Buchholz, Wolfgang Wagner, and Horst Wuennenberg Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 75 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-84-038; ISSN-0170-1339) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16

A gust alleviation system was applied to low wing loading and high aspect ratio aircraft in order to decrease gust induced vertical acceleration. An open loop gust alleviation system (OLGA) was realized. Gust angle is calculated from sensor signals and fed to the actuators which control the symmetric aileron as lift flaps and the horizontal stabilizer. Flight tests of the aileron rod control, for certification and parameter identification, for system optimization, and the demonstration of system efficiency show a substantial decrease in the gust induced vertical acceleration and pitch rate in the frequency range below 3 Hz. However, passenger comfort is far more determined by higher frequencies than expected. Problems are found by stimulating the natural frequencies of the aircraft structure. A fundamental improvement of system behavior is reached by implementation of specific notch filters.
Author (ESA)

N85-16778# Southampton Univ. (England).
MODELLING CIRCULATION CONTROL BY BLOWING
M. M. Soliman, R. V. Smith, and Yeovil I. C. Cheeseman *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 7 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

N85-16814*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A REVIEW OF US ARMY AIRCREW-AIRCRAFT INTEGRATION RESEARCH PROGRAMS
David L. Key and Edwin W. Aiken *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 15 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01 CSCL 01C

N85-16819# Rome Univ. (Italy).
HELICOPTER ACTIVE CONTROL WITH ROTOR BLADES RELAXATION
Achille Danesi and Arturo Danesi *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 17 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16893*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SSME DIGITAL CONTROL DESIGN CHARACTERISTICS
Walter T. Mitchell and Richard F. Searle *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 38-46 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16903*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SOME EFFECTS OF DIGITAL SAMPLING ON ORBITER FLIGHT CONTROL SYSTEM OPERATION
S. V. Murray *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 125-136 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N85-16882*# National Aeronautics and Space Administration, Washington, D. C.
RESULTS OF S5 CH TESTS WITH AN ARL (AEROSPACE RESEARCH LABORATORY) CASCADE
A. Fourmaux Dec. 1984 34 p refs Transl. into ENGLISH of "Resultats d'essais a S5 CH d'une grille d'aubes ARL (Aerospace Research Laboratory)" rept. RT-5/3568-EN, Paris, Mar. 1984 31 p Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original document prepared by ONERA, Paris
(Contract NASw-4005)
(NASA-TM-77510; NAS 1.15:77510; ONERA-RT-5/3568-EN) Avail: NTIS HC A03/MF A01 CSCL 14B

As part of a research agreement between Iowa State University of Science and Technology (ISU) and ONERA, a blade cascade designed and already tested in the United States was manufactured and tested in France. The ONERA cascade wind tunnel and mock-up are described. Attention is focused on defining the upstream conditions of the cascade. Experimental results are presented, as well as comparisons with tests conducted by Detroit Diesel Allison (DDA) in the United States. B.W.

N85-16883*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LANGLEY MACH 4 SCRAMJET TEST FACILITY
Earl H. Andrews, Jr., Marvin G. Torrence, Griffin Y. Anderson, G. Burton Northam, and Ernest A. Mackley Feb. 1985 56 p refs (NASA-TM-86277; L-15827; NAS 1.15:86277) Avail: NTIS HC A04/MF A01 CSCL 14B

An engine test facility was constructed at the NASA Langley Research Center in support of a supersonic combustion ramjet (scramjet) technology development program. Hydrogen combustion in air with oxygen replenishment provides simulated air at Mach 4 flight velocity, pressure, and true total temperature for an altitude range from 57,000 to 86,000 feet. A facility nozzle with a 13 in square exit produces a Mach 3.5 free jet flow for engine propulsion tests. The facility is described and calibration results are presented which demonstrate the suitability of the test flow for conducting scramjet engine research. Author

N85-16884# Oak Ridge National Lab., Tenn.
EVALUATION OF ARCTIC TEST OF IMPROVED TRITIUM RADIOLUMINESCENT LIGHTING Final Report, Nov. 1983 - Feb. 1984
K. W. Haff, J. A. Tompkins, L. J. Hult, and C. L. Bupp Aug. 1984 73 p
(AF Proj. 2673)
(AD-A148215; AFESC/ESL-TR-84-19) Avail: NTIS HC A04/MF A01 CSCL 01/5

This test was conducted to determine if the improved generation of tritium radioluminescent runway lighting could effectively support aircraft operations in the Alaskan winter environment. The lighting system was unidirectional and consisted of threshold and touchdown zone lights (each end), edge lights, and Visual Approach Slope Indicator (VASI) lights. The primary lighting layout tested was similar to that required by Military Airlift Command regulations for C-130 operations. Nearly all pilots rated the runway lights satisfactory for use at tactical operating locations. Visual acquisition range was 3 to 5 miles under dark conditions. This distance was decreased by ambient lighting conditions. Pilots landing into the twilight of a setting sun reported as little as 1 mile acquisition range. The VASI system was rated marginal by pilots. Increasing the number of radioluminescent panels used and the distance between the panels significantly improved acquisition and usable ranges. The tritium lights were extremely durable throughout the test. They required no maintenance except an occasional wipe off, and there were no failures or security violations. GRA

N85-16885# Weston (Roy F.), Inc., West Chester, Pa.
INSTALLATION RESTORATION PROGRAM. PHASE 2: STAGE 1 PROBLEM CONFIRMATION STUDY, DULUTH INTERNATIONAL AIRPORT DULUTH, MINNESOTA Final Report
Oct. 1984 213 p Sponsored by Air Force
(AD-A148318; AD-E700012) Avail: NTIS HC A10/MF A01 CSCL 13/2

The following are among the study's key conclusions: (1) Groundwater occurs under shallow water table conditions in and around all sites investigated. Lateral groundwater gradients typically average about 0.02. While the hydraulic driving force for groundwater contaminant migration is fairly large, the actual rate of movement of groundwater is slow due to the presence of low-permeability glacial till. (2) Regional water table flow is generally northerly. Locally, however, this regional gradient is modified by surface drainageways which intercept the upper few feet of water table flow. Discharge of shallow groundwater to these surface drainageways creates a potential for off-base migration of contaminants. (3) Such migration of contaminants is demonstrated by detection of solvent compounds in the surface drainageway adjacent to the DPDO Storage Area C and by observation of oily discharges in surface drainageways adjacent to the Fuel Storage Area. (4) Part-per-billion level concentrations of the pesticide DDD were found in the bottom sediments of the GMSDA (Goose Missile Site Disposal Area) but off-site migration appears to be negligible. A non-pesticide compound, tentatively identified as PCB, was detected in GMSDA sediments in the same general distribution as the pesticide. GRA

N85-16886# Clemson Univ., S.C. Dept. of Chemical Engineering.
LABORATORY SIMULATION OF SMOKE REDUCTION FROM AIRCRAFT ENGINE TEST CELL EXHAUST USING A FLUIDIZED BED FILTER Final Report, 1 Jun. 1983 - 31 Aug. 1984
R. W. Rice 22 Oct. 1984 37 p

(Grant AF-AFOSR-0147-83)
(AD-A148600; AFOSR-84-1078TR) Avail: NTIS HC A03/MF A01 GSCL 13/2

The lowering of aircraft engine test cell exhaust opacity by fluidized bed filtration of soot was simulated in the laboratory. Smoke from a diesel burner was diluted with ambient air and passed through a 25 cm diameter cylindrical bed of either 500 or 1000 micron glass spheres. Bed depths ranging from 2.5 to 10 cm and superficial gas velocities of 2 to 60 cm/s were studied. Using separate light-sources and photocell detectors, the optical densities of the bed inlet and outlet gas streams were simultaneously monitored. From these data percentage opacity reduction (POR) values were determined as a function of time. This measure of filtration efficiency was found to increase with bed depth, ranging from roughly 50% for a 2.5 cm deep bed of 1100 micron glass beads to 99% for a 10 cm deep bed of 500 micron beads. No appreciable decline in effectiveness was observed for periods of up to 1.5 hours. Attempts were made to supplement POR results with gravimetric measurements of particle loading and size distribution.made using a stack gas sampler (inertial impactor).
GRA

N85-16887# Arbeitsgemeinschaft Deutscher Verkehrsflughaefen, Stuttgart (West Germany). Abteilung Verkehr.
[ACTIVITIES REPORT ON WEST GERMAN CIVIL AIRPORTS. PART 1: TEXT] Annual Report, 1983 [VERKEHRSLEISTUNGEN DER DEUTSCHEN VERKEHRSFLUGHAEFEN. 1: TEXT]
Jun. 1984 63 p refs In GERMAN 2 Vol.
(ISBN-3-87977-055-7-Pt-1) Avail: NTIS HC A04/MF A01

The 1983 traffic activity report is given for the 11 international and 29 regional West German airports, including West Berlin. Information on the major Austrian airports as well as Basel and Zurich airports and another 200 European and non-European airports is also given. Aircraft movements, passenger numbers, air freight quantities, air mail, commercial traffic figures, evolution graphs over 25 years and vocabulary definitions are included.
Author (ESA)

N85-16888# Arbeitsgemeinschaft Deutscher Verkehrsflughaefen, Stuttgart (West Germany). Abteilung Verkehr.
[ACTIVITIES REPORT FOR THE WEST GERMAN CIVIL AIRPORTS. PART 2: TABLES] Annual Report, 1983 [VERKEHRSLEISTUNGEN DER DEUTSCHEN VERKEHRSFLUGHAEFEN. 2: TABELLEN]
1984 81 p refs In GERMAN 2 Vol.
(ISBN-3-87977-055-7-Pt-2) Avail: NTIS HC A05/MF A01

The 1983 traffic activity report for the 11 international and 29 regional West German airports, including West Berlin is summarized. Data on the major Austrian airports as well as Basel airport, Zurich airports and another 200 European and non-European airports is also given. Aircraft movements, passenger numbers, air freight quantities, air mail, commercial traffic figures, evolution graphs over 25 years and vocabulary definitions are presented.
Author (ESA)

N85-16770# Joint Publications Research Service, Arlington, Va.
AEROPROYEKT DEVELOPS IMPROVED RUNWAY SURFACING
A. Vinogradov *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 20-21 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 25 Sep. 1984 p 3 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

N85-16815# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
ADVANCED FLIGHT SIMULATION FOR HELICOPTER DEVELOPMENT
H. Huber, H.-J. Dahl, and A. Inglsperger *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 14 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16816# Centre d'Electronique de l'Armement, Bruz (France).
A SIMULATOR FOR STUDYING HELICOPTER WEAPONS SYSTEMS [UN SIMULATEUR D'ETUDES DE SYSTEMS D'ARMES HELICOPTERE]
Michel Huon *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 12 p refs In FRENCH (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16817# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ASSESSMENT OF SIMULATION FIDELITY USING MEASUREMENTS OF PILOTING TECHNIQUE IN FLIGHT
Warren F. Clement (Systems Technology, Inc., Mountain View, Calif.), William B. Cleveland, and David L. Key *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 12 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01 CSCL 14B

N85-16926*# Rockwell International Corp., Cocoa Beach, Fla.
OVERVIEW OD STS GROUND OPERATIONS/ORBITER TURNAROUND STS-1 THROUGH STS-7
Richard Schwartz *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 490-497 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01E

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N85-16889*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE TECHNICAL CONFERENCE, PART 1
Norman Chaffee, comp. Washington Jan. 1985 598 p refs Conf. held in Houston, Tex., 28-30 Jun. 1983 2 Vol.
(NASA-CP-2342-Pt-1; S-539-Pt-1; NAS 1.55:2342-Pt-1) Avail: NTIS HC A25/MF A01 CSCL 22A

Articles providing a retrospective presentation and documentation of the key scientific and engineering achievements of the Space Shuttle Program are compiled. Topics areas include: (1) integrated avionics; (2) guidance, navigation, and control; (3) aerodynamics; (4) structures; (5) life support; environmental control; and crew station; and (6) ground operations. For individual titles, see N85-16890 through N85-16936.

N85-16890*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EVOLUTION OF SHUTTLE AVIONICS REDUNDANCY MANAGEMENT/FAULT TOLERANCE **c06**
Jack C. Boykin, Joseph R. Thibodeau, and Henry E. Schneider (McDonnell-Douglas Technical Services Co., Houston, Tex.) *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 1-18 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

The challenge of providing redundancy management (RM) and fault tolerance to meet the Shuttle Program requirements of fail operational/fail safe for the avionics systems was complicated by the critical program constraints of weight, cost, and schedule. The basic and sometimes false effectivity of less than pure RM designs is addressed. Evolution of the multiple input selection filter (the heart of the RM function) is discussed with emphasis on the subtle interactions of the flight control system that were found to be potentially catastrophic. Several other general RM development problems are discussed, with particular emphasis on the inertial measurement unit RM, indicative of the complexity of managing that three string system and its critical interfaces with the guidance and control systems.
M.G.

N85-16891*# Honeywell, Inc., Clearwater, Fla.
SHUTTLE AVIONICS SOFTWARE TRIALS, TRIBULATIONS AND SUCCESS **c06**
O. L. Henderson *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 19-29 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

The early problems and the solutions developed to provide the required quality software needed to support the space shuttle engine development program are described. The decision to use a programmable digital control system on the space shuttle engine was primarily based upon the need for a flexible control system capable of supporting the total engine mission on a large complex pump fed engine. The mission definition included all control phases from ground checkout through post shutdown propellant dumping. The flexibility of the controller through reprogrammable software allowed the system to respond to the technical challenges and innovation required to develop both the engine and controller hardware. This same flexibility, however, placed a severe strain on the capability of the software development and verification organization. The overall development program required that the software facility accommodate significant growth in both the software requirements and the number of software packages delivered. This challenge was met by reorganization and evolution in the process of developing and verifying software. M.G.

N85-16892*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE AVIONICS SOFTWARE DEVELOPMENT TRIALS: TRIBULATIONS AND SUCCESSES, THE BACKUP FLIGHT SYSTEM **c06**
Edward S. Chevers *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 30-37 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

The development and verification of the Backup Flight System software (BFS) is discussed. The approach taken for the BFS was to develop a very simple and straightforward software program and then test it in every conceivable manner. The result was a program that contained approximately 12,000 full words including ground checkout and the built in test program for the computer. To perform verification, a series of tests was defined using the actual flight type hardware and simulated flight conditions. Then simulated flights were flown and detailed performance analysis was conducted. The intent of most BFS tests was to demonstrate that a stable flightpath could be obtained after engagement from an anomalous initial condition. The extention of the BFS to meet the requirements of the orbital flight test phase is also described. M.G.

N85-16893*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SSME DIGITAL CONTROL DESIGN CHARACTERISTICS **c08**
Walter T. Mitchell and Richard F. Searle *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 38-46 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

To protect against a latent programming error (software fault) existing in an untried branch combination that would render the space shuttle out of control in a critical flight phase, the Backup Flight System (BFS) was chartered to provide a safety alternative. The BFS is designed to operate in critical flight phases (ascent and descent) by monitoring the activities of the space shuttle flight subsystems that are under control of the primary flight software (PFS) (e.g., navigation, crew interface, propulsion), then, upon manual command by the flightcrew, to assume control of the space shuttle and deliver it to a noncritical flight condition (safe orbit or touchdown). The problems associated with the selection of the PFS/BFS system architecture, the internal BFS architecture, the fault tolerant software mechanisms, and the long term BFS utility are discussed. M.G.

N85-16894*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MAN-MACHINE INTERFACE AND CONTROL OF THE SHUTTLE DIGITAL FLIGHT SYSTEM **c54**
Richard D. Burghduff and James L. Lewis, Jr. *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 47-53 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 05H

The space shuttle main engine (SSME) presented new requirements in the design of controls for large pump fed liquid rocket engine systems. These requirements were the need for built in full mission support capability, and complexity and flexibility of function not previously needed in this type of application. An engine mounted programmable digital control system was developed to meet these requirements. The engine system and controller and their function are described. Design challenges encountered during the course of development included accommodation for a very severe engine environment, the implementation of redundancy and redundancy management to provide fail operational/fail safe capability, removal of heat from the package, and significant constraints on computer memory size and processing time. The flexibility offered by programmable control reshaped the approach to engine design and development and set the pattern for future controls development in these types of applications. Author

N85-16895*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE MAIN ENGINE HARDWARE SIMULATION **c20**
H. G. Vick and P. W. Hampton *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 54-63 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 21H

The Huntsville Simulation Laboratory (HSL) provides a simulation facility to test and verify the space shuttle main engine (SSME) avionics and software system using a maximum complement of flight type hardware. The HSL permits evaluations and analyses of the SSME avionics hardware, software, control system, and mathematical models. The laboratory has performed a wide spectrum of tests and verified operational procedures to ensure system component compatibility under all operating conditions. It is a test bed for integration of hardware/software/hydraulics. The HSL is and has been an invaluable tool in the design and development of the SSME. Author

N85-16896*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DEVELOPMENT AND IMPLEMENTATION OF THE VERIFICATION PROCESS FOR THE SHUTTLE AVIONICS SYSTEM **c06**
H. E. Smith, W. B. Fouts (Rockwell International Corp., Downey, Calif.), and J. Mesmer (Rockwell International Corp., Downey, Calif.) *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 64-75 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

The background of the shuttle avionics system design and the unique drivers associated with the redundant digital multiplexed data processing system are examined. With flight software pervading to the lowest elements of the flight critical subsystems, it was necessary to identify a unique and orderly approach of verifying the system as flight ready for STS-1. The approach and implementation plan is discussed, and both technical problems and management issues are dealt with. M.G.

N85-16897*# International Business Machines Corp., Cape Canaveral, Fla.
GROUND MAN-MACHINE INTERFACES FOR ORBITER CHECKOUT **c54**
F. Herb Blackmon *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 76-80 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 05H

The challenge of the concept of a reusable, cargo carrying space vehicle, and how those challenges were met for the Space Shuttle are discussed. The complexity of the vehicle, the ground support systen, the onboard computer system, ramifications of a

reusable vehicle, and the turn around objectives for Shuttle flights are outlined. The Apollo and the space transportation system (STS) are compared. E.A.K.

N85-16898*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
INTEGRATION OF GROUND AND ON-BOARD SYSTEM FOR TERMINAL COUNT **c16**
Charles A. Abner and Don H. Townsend *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 81-86 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The development of an integrated ground and onboard system for Space Shuttle terminal count management is discussed. The criteria considered in designing this system are outlined. Examples of problems encountered in the process of maturing the design are presented. E.A.K.

N85-16899*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
INTEGRATED DESIGN CHECKOUT OF SHUTTLE PAYLOAD AVIONICS INTERFACES **c06**
John F. Muratore and Kathy K. Whitcomb *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 87-96 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

Orbiter/payload avionics integration testing in the shuttle program are discussed. Payloads show extensive orbiter interfaces. The three testing modes used to verify orbiter/payload avionics interfaces are described. These modes consist of orbiter testing using generic payload simulators, payload testing utilizing the actual payload and a high fidelity orbiter simulator, and interface testing with the actual orbiter and payload. Several special avionics techniques, such as the split flight computer technique were developed for this testing. Experience from the first six shuttle cargoes is reviewed and problems found in testing that would have hampered mission success are emphasized. E.A.K.

N85-16900*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
AUTOMATION OF CHECKOUT FOR THE SHUTTLE OPERATIONS ERA **c16**
Judith A. Anderson and Kenneth O. Hendrickson *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 97-101 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The Space Shuttle checkout is different from its Apollo predecessor. The complexity of the hardware, the shortened turnaround time, and the software that performs ground checkout are outlined. Generating new techniques and standards for software development and the management structure to control it are implemented. The utilization of computer systems for vehicle testing is high lighted. E.A.K.

N85-16901*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE NAVIGATION STATUS **c04**
Emil R. Schiesser *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 102-112 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 17G

Shuttle navigation which is the determination of Orbiter position, velocity, and attitude and associated effort, together with guidance, flight control, consumables, and systems management, is required for classical navigation. Position and velocity propagation requires the measurement or modeling of the gravitational, aerodynamic, and rocket engine forces acting on the vehicle. Position and velocity determination is performed or observations of the distance to external features, the rate of change, and the direction toward the feature. Onboard state propagation is more often the mode of state knowledge maintenance, since the ability to determine position and velocity using such observations is limited. An overview of Shuttle nevigation is presented. E.A.K.

N85-16902*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DESCENT GUIDANCE AND MISSION PLANNING FOR SPACE SHUTTLE
B. Kent Joosten *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 113-124 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22A

The Space Shuttle descent mission planning, mission design, deorbit targeting, and entry guidance have necessarily become interrelated because of the nature of the Orbiter's design and mission requirements. The desired descent trajectory has been formulated in a drag acceleration/relative velocity state space since nearly all of the vehicle's highly constraining flight limitations can be uniquely represented in this plane. Constraints and flight requirements that affect the descent are described. The guidance logic which allows the Orbiter to follow the designed trajectory, the impacts of contingency aborts and flightcrew interaction are discussed. The mission planning and guidance techniques remain essentially unchanged through the Shuttle flight test program and subsequent operational flights. E.A.K.

N85-16903*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SOME EFFECTS OF DIGITAL SAMPLING ON ORBITER FLIGHT CONTROL SYSTEM OPERATION **c08**
S. V. Murray *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 125-136 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

An entry dynamic stability ground test of the OV102 Space Shuttle Orbiter revealed some small amplitude oscillatory output of the flight control system which could have constrained flight of the STS-1 mission. These limit-cycle-type outputs were attributed to a combination of rigid body motion of the Orbiter on its landing gear and some interesting effects of its digital flight control system. These effects included frequency aliasing and phenomena associated with digital quantitization of low amplitude sensor signals. The digital effects suggest significant improvements possible in future designs. E.A.K.

N85-16904*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE HANDLING QUALITIES **c16**
David W. Gilbert *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 137-142 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The initial Orbiter handling qualities requirements, their effect on the vehicle design, and how it all turned out through the first six orbital missions are reviewed. Specific areas consisting of hand controller considerations and the wheelie problem are discussed. The requirements for the pitch axis subsonic flight control system are reviewed. Results of recent simulator evaluations to compare the existing system at landing with several other configurations are presented. E.A.K.

N85-16905*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LOW-SPEED LONGITUDINAL ORBITER QUALITIES **c16**
Bruce G. Powers *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 143-150 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01C

The shuttle program took on the challenge of providing a manual landing capability for an operational vehicle returning from orbit. Some complex challenges were encountered in developing the longitudinal flying qualities required to land the orbiter manually in an operational environment. Approach and landing test flights indicated a tendency for pilot-induced oscillation near landing. Changes in the operational procedures reduced the difficulty of the landing task, and an adaptive stick filter was incorporated to reduce the severity of any pilot-induced oscillatory motions. Fixed-base, movingbase, and in-flight simulations were used for

the evaluations, and in general, flight simulation was the only reliable means of assessing the low-speed longitudinal flying qualities problems. Overall, the orbiter control system and operational procedures have produced a good capability to routinely perform precise landings with a large, unpowered vehicle with a low lift-to-drag ratio. Author

N85-16906*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE SPACE SHUTTLE ASCENT VEHICLE AERODYNAMIC CHALLENGES CONFIGURATION DESIGN AND DATA BASE DEVELOPMENT c16
Charlie C. Dill, J. C. Young, B. B. Roberts, M. K. Craig, J. T. Hamilton (Rockwell International Corp., Downey, Calif.), and W. W. Boyle (Lockheed Missiles and Space Co., Huntsville, Ala.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 157-176 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The phase B Space Shuttle systems definition studies resulted in a generic configuration consisting of a delta wing orbiter, and two solid rocket boosters (SRB) attached to an external fuel tank (ET). The initial challenge facing the aerodynamic community was aerodynamically optimizing, within limits, this configuration. As the Shuttle program developed and the sensitivities of the vehicle to aerodynamics were better understood the requirements of the aerodynamic data base grew. Adequately characterizing the vehicle to support the various design studies exploded the size of the data base to proportions that created a data modeling/management challenge for the aerodynamicist. The ascent aerodynamic data base originated primarily from wind tunnel test results. The complexity of the configuration rendered conventional analytic methods of little use. Initial wind tunnel tests provided results which included undesirable effects from model support tructure, inadequate element proximity, and inadequate plume simulation. The challenge to improve the quality of test results by determining the extent of these undesirable effects and subsequently develop testing techniques to eliminate them was imposed on the aerodynamic community. The challenges to the ascent aerodynamics community documented are unique due to the aerodynamic complexity of the Shuttle launch. Never before was such a complex vehicle aerodynamically characterized. The challenges were met with innovative engineering analyses/methodology development and wind tunnel testing techniques. Author

N85-16907*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE SPACE SHUTTLE LAUNCH VEHICLE AERODYNAMIC VERIFICATION CHALLENGES c16
R. O. Wallace, L. D. Austin, J. G. Hondros, T. E. Surber (Rockwell International Corp., Downey, Calif.), L. M. Gaines (Rockwell International Corp., Downey, Calif.), and J. T. Hamilton (Rockwell International Corp., Downey, Calif.) *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 177-188 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The Space Shuttle aerodynamics and performance communities were challenged to verify the Space Shuttle vehicle (SSV) aerodynamics and system performance by flight measurements. Historically, launch vehicle flight test programs which faced these same challenges were unmanned instrumented flights of simple aerodynamically shaped vehicles. However, the manned SSV flight test program made these challenges more complex because of the unique aerodynamic configuration powered by the first man-rated solid rocket boosters (SRB). The analyses of flight data did not verify the aerodynamics or performance preflight predictions of the first flight of the Space Transportation System (STS-1). However, these analyses have defined the SSV aerodynamics and verified system performance. The aerodynamics community also was challenged to understand the discreancy between the wind tunnel and flight defined aerodynamics. The preflight analysis challenges, the aerodynamic extraction challenges, and the postflight analyses challenges which led to the SSV system performance verification and which will lead to the verification of the operational ascent aerodynamics data base are presented. Author

N85-16908*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE AERODYNAMIC CHALLENGES OF SRB RECOVERY c16
D. L. Bacchus, D. A. Kross, and R. D. Moog (Martin Marietta Corp., Denver, Colo.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 189-208 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22A

Recovery and reuse of the Space Shuttle solid rocket boosters was baselined to support the primary goal to develop a low cost space transportation system. The recovery system required for the 170,000-lb boosters was for the largest and heaviest object yet to be retrieved from exoatmospheric conditions. State-of-the-art design procedures were ground-ruled and development testing minimized to produce both a reliable and cost effective system. The ability to utilize the inherent drag of the boosters during the initial phase of reentry was a key factor in minimizing the parachute loads, size and weight. A wind tunnel test program was devised to enable the accurate prediction of booster aerodynamic characteristics. Concurrently, wind tunnel, rocket sled and air drop tests were performed to develop and verify the performance of the parachute decelerator subsystem. Aerodynamic problems encountered during the overall recovery system development and the respective solutions are emphasized. Author

N85-16909*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE AERODYNAMIC CHALLENGES OF THE DESIGN AND DEVELOPMENT OF THE SPACE SHUTTLE ORBITER c16
James C. Young, Jimmy M. Underwood, Ernest R. Hillje, Arthur M. Whitnah, Paul O. Romere, Joe D. Gamble, Barney -B. Roberts, George M. Ware, William I. Scallion, Bernard Spencer, Jr. et al *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 209-263 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The major aerodynamic design challenge at the beginning of the United States Space Transportation System (STS) research and development phase was to design a vehicle that would fly as a spacecraft during early entry and as an aircraft during the final phase of entry. The design was further complicated because the envisioned vehicle was statically unstable during a portion of the aircraft mode of operation. The second challenge was the development of preflight aerodynamic predictions with an accuracy consistent with conducting a manned flight on the initial orbital flight. A brief history of the early contractual studies is presented highlighting the technical results and management decisions influencing the aerodynamic challenges. The configuration evolution and the development of preflight aerodynamic predictions will be reviewed. The results from the first four test flights shows excellent agreement with the preflight aerodynamic predictions over the majority of the flight regimes. The only regimes showing significant disagreement is confined primarily to early entry, where prediction of the basic vehicle trim and the influence of the reaction control system jets on the flow field were found to be deficient. Postflight results are analyzed to explain these prediction deficiencies. Author

N85-16910*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE DEVELOPMENT AND APPLICATION OF AERODYNAMIC UNCERTAINTIES: AND FLIGHT TEST VERIFICATION FOR THE SPACE SHUTTLE ORBITER c16
Joe D. Gamble, Douglas R. Cooke, Jimmy M. Underwood, Howard W. Stone, Jr., and Donald C. Schlosser (Rockwell International Corp., Downey, Calif.) *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 264-294 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The approach used in establishing the predicted aerodynamic

uncertainties and the process used in applying these uncertainties during the design of the Orbiter flight control system and the entry trajectories are presented. The flight test program that was designed to verify the stability and control derivatives with a minimum of test flights is presented and a comparison of preflight predictions with preliminary flight test results is made. It is concluded that the approach used for the Orbiter is applicable to future programs where testing is limited due to time constraints or funding. Author

N85-16911*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AERODYNAMIC CHALLENGES OF ALT c16
Ivy Hooks, David Homan, and Paul Romere *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 295-312 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01

The approach and landing test (ALT) of the Space Shuttle Orbiter presented a number of unique challenges in the area of aerodynamics. The purpose of the ALT program was both to confirm the use of the Boeing 747 as a transport vehicle for ferrying the Orbiter across the country and to demonstrate the flight characteristics of the Orbiter in its approach and landing phase. Concerns for structural fatigue and performance dictated a tailcone be attached to the Orbiter for ferry and for the initial landing tests. The Orbiter with a tailcone attached presented additional challenges to the normal aft sting concept of wind tunnel testing. The landing tests required that the Orbiter be separated from the 747 at approximately 20,000 feet using aerodynamic forces to fly the vehicles apart. The concept required a complex test program to determine the relative effects of the two vehicles on each other. Also of concern, and tested, was the vortex wake created by the 747 and the means for the Orbiter to avoid it following separation. Author

N85-16912*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE ORBITER AIR DATA SYSTEM c06
Ernest R. Hillje *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 313-324 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

Air data parameters are required during Orbiter atmospheric entry for use by the autoguidance, navigation, and flight control systems, and for crew displays. Conventional aircraft calibrations of the Orbiter air data system were not practicable for the Space Shuttle, therefore extensive wind tunnel testing was required to give confidence in the preflight calibrations. Many challenges became apparent as the program developed; in the overall system design, in the wind tunnel testing program, in the implementation of the air data system calibration, and in the use of the flight data to modify the wind tunnel results. These challenges are discussed along with the methods used to solve the problems. Author

N85-16913*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE STRUCTURAL DYNAMICS CHARACTERISTICS: THE ANALYSIS AND VERIFICATION c16
C. Thomas Modlin, Jr. and George A. Zupp, Jr. *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 325-334 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The space shuttle introduced a new dimension in the complexity of the structural dynamics of a space vehicle. The four-body configuration exhibited structural frequencies as low as 2 hertz with a model density on the order of 10 modes per hertz. In the verification process, certain mode shapes and frequencies were identified by the users as more important than others and, as such, the test objectives were oriented toward experimentally extracting those modes and frequencies for analysis and test correlation purposes. To provide the necessary experimental data, a series of ground vibration tests (GVT's) was conducted using test articles ranging from the 1/4-scale structural replica of the space shuttle to the full-scale vehicle. The vibration test and analysis program revealed that the mode shapes and frequency correlations below 10 hertz were good. The quality of correlation of modes between 10 and 20 hertz ranged from good to fair and that of modes above 20 hertz ranged from poor to good. Since the most important modes, based on user preference, were below 10 hertz, it was judged that the shuttle structural dynamic models were adequate for flight certifications. R.S.F.

N85-16914*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
STRUCTURAL LOAD CHALLENGES DURING SPACE SHUTTLE DEVELOPMENT c16
Alden C. Mackey and Ralph E. Gatto (Rockwell International Corp., Downey, Calif.) *In its* Sapce Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 335-344 ref (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The challenges that resulted from the unique configuration of the space shuttle and capabilities developed to meet these challenges are described. The methods and the organization that were developed to perform dynamic loads analyses on the space shuttle configuration and to assess dynamic data developed after design are discussed. Examples are presented from the dynamic loads analysis of the lift-off and maximum dynamic pressure portion of ascent. Also shown are orbital flight test results, for which selected predicted responses are compared to measured data for the lift-off and high-dynamic-pressure times of ascent. These results have generally verified the design analysis. However, subscale testing was found to be deficient in predicting full-scale results in two areas: the ignition overpressure at lift-off and the aerodynamics/plume interactions at high-q boost. In these areas, the results of the flight test program were accommodated with no impact to the vehicle design. R.S.F.

N85-16915*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER STRUCTURAL DESIGN AND VERIFICATION c16
Philip C. Glynn and Thomas L. Moser *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 345-356 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The space shuttle development program provided the opportunity to challenge many of the established practices and approaches used in prior manned space flight programs. The most significant accomplishments and resulting precedents which emerged during the structural development of the space shuttle and the space shuttle orbiter are reviewed. Innovations in criteria, design solutions, and certification are highlighted, and brief comments on the lessons learned are included. Thermal stress, graphite epoxy moisture, window structure, and structural inspection are discussed under lessons learned. R.S.F.

N85-16916*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE EXTERNAL TANK PERFORMANCE IMPROVEMENTS: THE CHALLENGE c16
Harold R. Coldwater, Richard R. Foll (Martin Marietta Corp., New Orleans, La.), Gayle J. Howell (Martin Marietta Corp., New Orleans, La.), and Jon A. Dutton (Martin Marietta Corp., New Orleans, La.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 357-364 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The external tank (ET) has been actively involved in performance improvements since the inception of the space shuttle program, primarily by weight savings. Weight savings were realized on the first block of flight articles (standard weight tank). With a need for further performance improvements, the ET Program Office was requested to develop a program to reduce tank weight an additional 6000 lb and schedule delivery of the first lightweight ET (LWT) for June 1982. The weight savings program was accomplished by: (1) a unique approach to use of factors of safety;

(2) design optimization; and (3) redesign of structures with large margins of safety which resulted in an actual weight savings of 7294 lb. Additional studies have identified further weight savings which are to be implemented at appropriate times in production flow. Examples are an improved thermal protection system for the LH2 tank aft dome and reduction of slosh baffles in the LO2 tank based on flight data. All performance improvements were compared and selected based on non-recurring and recurring cost and technical risk. Author

N85-16917*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STRUCTURAL AND MECHANICAL DESIGN CHALLENGES OF SPACE SHUTTLE SOLID ROCKET BOOSTERS SEPARATION AND RECOVERY SUBSYSTEMS c16
William R. Woodis (Martin Marietta Corp., Denver, Colo.) and Roy E. Runkle *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 365-386 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22A

The design of the space shuttle solid rocket booster (SRB) subsystems for reuse posed some unique and challenging design considerations. The separation of the SRBs from the cluster (orbiter and external tank) at 150,000 ft when the orbiter engines are running at full thrust meant the two SRBs had to have positive separation forces pushing them away. At the same instant, the large attachments that had reacted launch loads of 7.5 million pounds thrust had to be servered. These design considerations dictated the design requirements for the pyrotechnics and separation rocket motors. The recovery and reuse of the two SRBs meant they had to be safely lowered to the ocean, remain afloat, and be owed back to shore. In general, both the pyrotechnic and recovery subsystems have met or exceeded design requirements. In twelve vehicles, there has only been one instance where the pyrotechnic system has failed to function properly. R.S.F.

N85-16918*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SSME LIFETIME PREDICTION AND VERIFICATION, INTEGRATING ENVIRONMENTS, STRUCTURES, MATERIALS: THE CHALLENGE c16
Robert S. Ryan, Larry D. Salter, George M. Young, III, and Paul M. Munafo *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 386-402 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The planned missions for the space shuttle dictated a unique and technology-extending rocket engine. The high specific impulse requirements in conjunction with a 55-mission lifetime, plus volume and weight constraints, produced unique structural design, manufacturing, and verification requirements. Operations from Earth to orbit produce severe dynamic environments, which couple with the extreme pressure and thermal environments associated with the high performance, creating large low cycle loads and high alternating stresses above endurance limit which result in high sensitivity to alternating stresses. Combining all of these effects resulted in the requirements for exotic materials, which are more susceptible to manufacturing problems, and the use of an all-welded structure. The challenge of integrating environments, dynamics, structures, and materials into a verified SSME structure is discussed. The verification program and developmental flight results are included. The first six shuttle flights had engine performance as predicted with no failures. The engine system has met the basic design challenges. R.S.F.

N85-16919*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE CHALLENGING SCALES OF THE BIRD: SHUTTLE TILE STRUCTURAL INTEGRITY c16
William C. Schneider and Glenn J. Miller *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 403-413 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

The principal design issues, tests, and analyses required to solve the tile integrity problem on the space shuttle orbiters are addressed. Proof testing of installed tiles is discussed along with an airflow test of special tiles. Orbiter windshield tiles are considered in terms of changes necessary to ensure acceptable margins of safety for flight. R.S.F.

N85-16920*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CHALLENGES IN THE DEVELOPMENT OF THE ORBITER ATMOSPHERE REVITALIZATION SUBSYSTEM c16
R. Norman Prince, Joe Swider (Hamilton Standard, Windsor Locks, Conn.), John Wojnarowski (Hamilton Standard, Windsor Locks, Conn.), Angelo Decrisantis (Hamilton Standard, Windsor Locks, Conn.), George R. Ord (Moog, Inc., East Aurora, N.Y.), James J. Walleshauser (Moog, Inc., East Aurora, N.Y.), and John W. Gibb (Rockwell International Corp., Downey, Calif.) *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 414-425 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 06K

The space shuttle orbiter atmospheric revitalization subsystem provides thermal and contaminant control as well as total- and oxygen partial-pressure control of the environment within the orbiter crew cabin. Challenges that occurred during the development of this subsystem for the space shuttle orbiter are described. The design of the rotating hardware elements of the system (pumps, fans, etc.) required significant development to meet the requirements of long service life, maintainability, and high cycle-fatigue life. As a result, a stringent development program, particularly in the areas of bearing life and heat dissipation, was required. Another area requiring significant development was cabin humidity control and condensate collection. R.S.F.

N85-16921*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CHALLENGES OF DEVELOPING AN ELECTRO-OPTICAL SYSTEM FOR MEASURING MAN'S OPERATIONAL ENVELOPE c54
Barbara Woolford *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 426-434 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 05H

In designing work stations and restraint systems, and in planning tasks to be performed in space, a knowledge of the capabilities of the operator is essential. Answers to such questions as whether a specific control or work surface can be reached from a given restraint and how much force can be applied are of particular interest. A computer-aided design system has been developed for designing and evaluating work stations, etc., and the Anthropometric Measurement Laboratory (AML) has been charged with obtaining the data to be used in design and modeling. Traditional methods of measuring reach and force are very labor intensive and require bulky equipment. The AML has developed a series of electro-optical devices for collecting reach data easily, in computer readable form, with portable systems. The systems developed, their use, and data collected with them are described. Author

N85-16922*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CHALLENGES IN THE DEVELOPMENT OF THE SHUTTLE EXTRAVEHICULAR MOBILITY UNIT c54
Harold J. McMann and James W. McBarron, II *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 435-449 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 05H

The development of the Shuttle extravehicular mobility unit (EMU) has required significant technology advances in the design of the astronaut life support system and space-suit assembly. The life support system and space-suit assemblies are integrated into a single system and optimized for the primary function of supporting astronaut extravehicular operations. Rather than accommodating a limited, male-only astronaut population, the EMU must satisfy

size requirements for both males and females with a minimum of sized parts. In addition, the Shuttle EMU has been designed to implement Space Shuttle Program philosophy of long operating life and mission reuse capability to minimize program lifetime cost. The advancement in life support system and space-suit technology achieved by the development of the Shuttle extravehicular mobility unit (EMU) is illustrated by comparison with the requirements for and the design features of the Apollo EMU. B.W.

N85-16923*# Hamilton Standard, Windsor Locks, Conn.
CHALLENGES IN THE DEVELOPMENT OF THE ORBITER ACTIVE THERMAL CONTROL SUBSYSTEM c54
John R. Nason, Frederic A. Wierum (Rice Univ., Houston, Tex.), and James L. Yanosy *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 450-464 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 06K

A number of major challenges were faced in the design and development of the Orbiter Active Thermal Control Subsystem (ATCS). At the system level, the initial challenges were to define an approach that would interface dual Freon coolant loops with multiple coolant loops from other vehicle subsystems with the lowest weight penalty to the Orbiter; and to provide highly responsive vehicle heat rejection throughout all of the Orbiter mission phases. Optimized heat exchangers, representing an advance in the state-of-the-art in heat exchanger design, were developed to transfer heat between the orbiter Freon coolant loops and five other vehicle systems. Flash evaporation was selected as a highly efficient and responsive means for cooling the Orbiter Freon loops during ascent and entry. The Flash Evaporator Subsystem (FES) utilizes cyclic water spray cooling in a chamber maintained at or below the water triple point pressure. A summary of the basic heat transfer research conducted to identify the fundamental heat transfer processes involved in water spray cooling in support of the FES design is given. The high fidelity dynamic analytical model of the FES that was generated to aid in the design of control logic, evaluate performance and simulate ground test and flight anomalies is discussed. A description of the FES and Integrated ATCS testing conducted in the SESL chamber A at NASA-JSC is also presented. B.W.

N85-16924*# Rockwell International Corp., Downey, Calif.
OTHER CHALLENGES IN THE DEVELOPMENT OF THE ORBITER ENVIRONMENTAL CONTROL HARDWARE c54
John W. Gibb, M. E. McIntosh, Steven R. Heinrich (Fairchild Control Systems Co., Manhattan Beach, Calif.), Emory Thomas (Brunswick Corp., Costa Mesa, Calif.), Mike Steele (Brunswick Corp., Costa Mesa, Calif.), Franz Schubert (Life Systems, Inc., Cleveland, Ohio), E. P. Koszenski (Life Systems, Inc., Cleveland, Ohio), R. A. Wynveen (Life Systems, Inc., Cleveland, Ohio), R. W. Murray (General Electric Co., Valley Forge, Pa.), J. D. Schelkopf (General Electric Co., Valley Forge, Pa.) et al *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 465-479 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 06K

Development of the Space Shuttle orbiter environmental control and life support system (ECLSS) included the identification and resolution of several interesting problems in several systems. Some of these problems occurred late in the program, including the flight phase. Problems and solutions related to the ammonia boiler system (ABS), smoke detector, water/hydrogen separator, and waste collector system (WCS) are addressed. B.W.

N85-16925*# Vought Aeronautics, Dallas, Tex.
CHALLENGES IN THE DEVELOPMENT OF THE ORBITER RADIATOR SYSTEM c16
J. L. Williams, J. A. Oren, M. F. Modest (University of Southern California, Los Angeles), and H. R. Howell *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 480-489 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

Major technical challenges which were met in the design and development of the Space Shuttle Orbiter Radiator System are discussed. This system rejects up to 30 kW of waste heat from eight individual radiators having a combined surface area of 175 sq m. The radiators, which are deployable, are mounted on the inside of the payload bay doors for protection from aerodynamic heating during ascent and re-entry. While in orbit the payload bay doors are opened to expose the radiators for operation. An R21 coolant loop accumulates waste heat from various components in the Orbiter and delivers the heat to the radiators for rejection to space. Specific challenges included high acoustically induced loads during lift-off, severe radiating area constraints, demanding heat load control requirements, and long life goals. Details of major design and analysis efforts are discussed. The success of the developed hardware in satisfying mission objectives showed how well the design challenge was met. B.W.

N85-16926*# Rockwell International Corp., Cocoa Beach, Fla.
OVERVIEW OD STS GROUND OPERATIONS/ORBITER TURNAROUND STS-1 THROUGH STS-7 c09
Richard Schwartz *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 490-497 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01E

A review of STS-1 processing is presented as a reference for Shuttle processing time and the magnitude of the associated modifications, discrepancies, technical requirements, and ground systems activities. STS-1 processing provided the basis from which a plan to perform operational turnaround was established. Turnaround processing for Launch and Landing are treated separately to depict more clearly the progress made to reduce turnaround time and manhours expended. Turnaround time was reduced from 187 days for STS-2 to 60 days for STS-7 and landing turnaround was reduced from 14 days to 5 days. Modifications were reduced from 114 to 51. Requirements changes for launch readiness verification were reduced from 536 to 107. Special tests or inspections were reduced from 292 to 52. Anomalies resolved concurrent with processing were reduced from 13,000 to 4,000. Integration in the Vehicle Assembly Building (VAB) is about 10 percent of the flow, and Launch Pad operations comprise 40 percent of the turnaround. The work force has matured and has demonstrated the capability to perform planned and contingency operations. The turnaround program is fast approaching the goal of becoming operational. B.W.

N85-16927*# Martin Marietta Corp., Cocoa Beach, Fla.
EXTERNAL TANK PROCESSING FROM BARGE TO PAD c16
J. E. Carpenter *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 498-504 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

Delivery and launch readiness events for the External Tanks (ET) are discussed. The ET is off-loaded at the KSC Barge Turning Basin and towed to the Vertical Assembly Building (VAB), High Bay Transfer Aisle. It is erected vertically and placed in the ET Checkout Area of High Bay 2 or 4 for standalone checkout. At the completion of checkout the ET is transferred to storage or to the Integration Area of High Bay 1 or 3 for SRB and Orbiter Mate. A Systems Integration Test performed with the Orbiter and Solid Rocket Booster is described. Final checkout activities are also described. B.W.

N85-16928*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
SOLID ROCKET BOOSTER RETRIEVAL OPERATIONS c16
Anker M. Rasmussen *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 505-509 ref (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

Solid Rocket Booster Retrieval operations are discussed in detail. The recovery of expended boosters and associated hardware without damage attributable to retrieval procedures is the main goal. The retrieval force consists tof ship's personnel and retrieval team members, each of whom has been trained and is highly skilled in multi-faceted operations. The retrieval force is equipped

with two specially-built, highly maneuverable ships outfitted with parachute reels, retrieval cranes, towing winches, large volume-low pressure air compressors, SCUBA diving gear, inflatable boats with outboard motors and diver-operated SRB dewatering devices. The two ships are deployed in sufficient time to conduct an electronic and visual search of the impact area prior to launch. Upon search completeion, each ship takes station a safe distance from the predetermined impact point initiating both visual and electronic search in the direction of flight path, ensuring SRB acquisition at splashdown. When safe, the ships enter the impact area and commence recovery of all floating flight hardware which is subsequently returned to the Disassembly Facility for refurbishment and reuse. Retrieval techniques have evolved in parallel with equipment and flight hardware configuration changes. Additional changes have been initiated to improve personnel safety.

B.W.

N85-16929*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

SPACE SHUTTLE FLIGHT READINESS FIRING DRESS REHEARSAL FOR STS-1 **c16**

Warren L. Riles *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 510-524 refs (For primary document see N85-16889 08-12)

Avail: NTIS HC A25/MF A01 CSCL 22B

The static firing of the Space Shuttle Main Engine in preparation for the launch of the Enterprise Orbiter is discussed. The following were also tested: structures and mechanics; thermal design integration; propulsion and power; avionics and software; guidance, navigation, and control; mechanical systems; communications and tracking; and integrated ground systems. R.J.F.

N85-16930*# Rockwell International Corp., Cocoa Beach, Fla.

TRANSITION TO THE SPACE SHUTTLE OPERATIONS ERA **c16**

In NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 525-531 (For primary document see N85-16889 08-12)

Avail: NTIS HC A25/MF A01 CSCL 22A

The tasks involved in the Space Shuttle Development Program are discussed. The ten major characteristics of an operational Shuttle are described, as well as the changes occurring in Shuttle processing, on-line operations, operations engineering, and support operations. A summary is given of tasks and goals that are being pursued in the effort to create a cost effective and efficient system. R.J.F.

N85-16931*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

LAUNCH PROCESSING SYSTEM CONCEPT TO REALITY **c16**

William W. Bailey *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 532-538 refs (For primary document see N85-16889 08-12)

Avail: NTIS HC A25/MF A01 CSCL 22D

The Launch Processing System represents Kennedy Space Center's role in providing a major integrated hardware and software system for the test, checkout and launch of a new space vehicle. Past programs considered the active flight vehicle to ground interfaces as part of the flight systems and therefore the related ground system was provided by the Development Center. The major steps taken to transform the Launch Processing System from a concept to reality with the successful launches of the Shuttle Programs Space Transportation System are addressed.

Author

N85-16932*# Martin Marietta Corp., Cocoa Beach, Fla.

AUTOMATIC SOFTWARE FOR CONTROLLING CRYOGENIC SYSTEMS **c61**

James W. Rudolph *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 539-549 (For primary document see N85-16889 08-12)

Avail: NTIS HC A25/MF A01 CSCL 09B

A technical discussion of the lessons learned during the seven years of software development/testing which occurred on the Liquid Oxygen System for the Space Shuttle at the Kennedy Space Center is given. Problems which were solved during these years came into four distinct phases: design/debug before simulation runs, verification using simulation with models up through Space Transportation System-1 launch, hardware usage from first launch to Space Transportation System-5 launch, and future use. Each problem/solution describes the apparent problem requirements/constraints, usable alternatives, selected action, and results. R.J.F.

N85-16933*# Martin Marietta Corp., Cocoa Beach, Fla.

MATHEMATICAL MODELS FOR SPACE SHUTTLE GROUND SYSTEMS **c16**

Edward G. Tory *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 551-557 refs (For primary document see N85-16889 08-12)

Avail: NTIS HC A25/MF A01 CSCL 22D

Math models are a series of algorithms, comprised of algebraic equations and Boolean Logic. At Kennedy Space Center, math models for the Space Shuttle Systems are performed utilizing the Honeywell 66/80 digital computers, Modcomp II/45 Minicomputers and special purpose hardware simulators (MicroComputers). The Shuttle Ground Operations Simulator operating system provides the language formats, subroutines, queueing schemes, execution modes and support software to write, maintain and execute the models. The ground systems presented consist primarily of the Liquid Oxygen and Liquid Hydrogen Cryogenic Propellant Systems, as well as liquid oxygen External Tank Gaseous Oxygen Vent Hood/Arm and the Vehicle Assembly Building (VAB) High Bay Cells. The purpose of math modeling is to simulate the ground hardware systems and to provide an environment for testing in a benign mode. This capability allows the engineers to check out application software for loading and launching the vehicle, and to verify the Checkout, Control, & Monitor Subsystem within the Launch Processing System. It is also used to train operators and to predict system response and status in various configurations (normal operations, emergency and contingent operations), including untried configurations or those too dangerous to try under real conditions, i.e., failure modes. R.J.F.

N85-16934*# Rockwell International Corp., Cocoa Beach, Fla.

MANAGING COMPUTER-CONTROLLED OPERATIONS **c60**

John B. Plowden *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 558-564 (For primary document see N85-16889 08-12)

Avail: NTIS HC A25/MF A01 CSCL 09B

A detailed discussion of Launch Processing System Ground Software Production is presented to establish the interrelationships of firing room resource utilization, configuration control, system build operations, and Shuttle data bank management. The production of a test configuration identifier is traced from requirement generation to program development. The challenge of the operational era is to implement fully automated utilities to interface with a resident system build requirements document to eliminate all manual intervention in the system build operations. Automatic update/processing of Shuttle data tapes will enhance operations during multi-flow processing. R.J.F.

N85-16935*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

SUPPORT SYSTEMS DESIGN AND ANALYSIS **c16**

Robert M. Ferguson *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 565-572 (For primary document see N85-16889 08-12)

Avail: NTIS HC A25/MF A01 CSCL 22D

The integration of Kennedy Space Center (KSC) ground support systems with the new launch processing system and new launch vehicle provided KSC with a unique challenge in system design and analysis for the Space Transportation System. Approximately 70 support systems are controlled and monitored by the launch processing system. Typical systems are main propulsion oxygen and hydrogen loading systems, environmental control life support system, hydraulics, etc. An End-to-End concept of documentation

and analysis was chosen and applied to these systems. Unique problems were resolved in the areas of software analysis, safing under emergency conditions, sampling rates, and control loop analysis. New methods of performing End-to-End reliability analyses were implemented. The systems design approach selected and the resolution of major problem areas are discussed. R.J.F.

N85-16936*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
HISTORY, DESIGN AND PERFORMANCE OF THE SPACE SHUTTLE HAZARDOUS GAS DETECTION SYSTEM c06
William R. Helms *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt.1 Jan. 1985 p 573-580 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01D

The Hazardous Gas Detection System (HGDS) is designed to detect leaks which could result in pre-launch or in-flight fires or explosions resulting from the presence of cryogenic rocket propellants. The historical development, design, and performance of the HGDS is discussed. Data for response time, detection limits, accuracy, and drift are presented. Finally, present and future applications are discussed, and some general conclusions are drawn. R.J.F.

N85-16937*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE TECHNICAL CONFERENCE, PART 2
Norman Chaffee, comp. Jan. 1985 530 p refs Conf. held in Houston, Tex., 28-30 Jun. 1983 2 Vol.
(NASA-CP-2342-Pt-2; S-539; NAS 1.55:2342-Pt-2) Avail: NTIS HC A23/MF A01 CSCL 22A

The retrospective presentation provides technical disciplinary focus in the following technical areas: (1) integrated avionics; (2) guidance, navigation, and control; (3) aerodynamics; (4) structures; (5) life support, environmental control, and crew station; (6) ground operations; (7) propulsion and power; (8) communications and tracking; (9) mechanics and mechanical systems; and (10) thermal and contamination environments and protection systems. For individual titles, see N85-16938 through N85-16980.

N85-16938*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PROPULSION AND POWER SYSTEMS PERSPECTIVE c06
Joseph G. Thibodaux, Jr. *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 581-584 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 21H

Evolution from the original vehicle size and configuration to the present Space Shuttle is discussed with emphasis on the propulsion and power systems. B.G.

N85-16939*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CRYOGENIC PROPELLANT MANAGEMENT: INTEGRATION OF DESIGN, PERFORMANCE AND OPERATIONAL REQUIREMENTS c28
Armis L. Worlund, John R. Jamieson, Jr., Timothy W. Cole (Martin Marietta Corp., New Orleans, La.), and Tibor I. Lak (Rockwell International Corp., Downey, Calif.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 585-599 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 21I

The integration of the design features of the Shuttle elements into a cryogenic propellant management system is described. The implementation and verification of the design/operational changes resulting from design deficiencies and/or element incompatibilities encountered subsequent to the critical design reviews are emphasized. Major topics include: subsystem designs to provide liquid oxygen (LO2) tank pressure stabilization, LO2 facility vent for ice prevention, liquid hydrogen (LH2) feedline high point bleed, pogo suppression on the Space Shuttle Main Engine (SSME), LO2 low level cutoff, Orbiter/engine propellant dump, and LO2 main feedline helium injection for geyser prevention. Author

N85-16940*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE MAIN ENGINE: INTERACTIVE DESIGN CHALLENGES c20
John P. McCarty and Byron K. Wood (Rockwell International Corp.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 600-617 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22H

The operating requirements established by NASA for the SSME were considerably more demanding than those for earlier rocket engines used in the military launch vehicles or Apollo program. The SSME, in order to achieve the high performance, low weight, long life, reusable objectives, embodied technical demands far in excess of its predecessor rocket engines. The requirements dictated the use of high combustion pressure and the staged combustion cycle which maximizes performance through total use of all propellants in the main combustion process. This approach presented a myriad of technical challenges for maximization of performance within attainable state of the art capabilities for operating pressures, operating temperatures and rotating machinery efficiencies. Controlling uniformity of the high pressure turbomachinery turbine temperature environment was a key challenge for thrust level and life capability demanding innovative engineering. New approaches in the design of the components were necessary to accommodate the multiple use, minimum maintenance objectives. Included were the use of line replaceable units to facilitate field maintenance automatic checkout and internal inspection capabilities. Author

N85-16941*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SOLID ROCKET MOTOR CERTIFICATION TO MEET SPACE SHUTTLE REQUIREMENTS FROM CHALLENGE TO ACHIEVEMENT c20
John Q. Miller and Joe C. Kilminster (Thiokol, Inc., Brigham City, Utah) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 618-627 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 21H

Three solid rocket motor (SRM) design requirements for the Space Shuttle were discussed. No existing solid rocket motor experience was available for the requirement for a thrust-time trace, twenty uses for the principle hardware, and a moveable nozzle with an 8 deg. omnivaxial vectoring capability. The solutions to these problems are presented. B.G.

N85-16942*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DEBRIS CONTROL DESIGN ACHIEVEMENTS OF THE BOOSTER SEPARATION MOTORS c20
Gerald W. Smith and Charles A. Chase (United Technologies Corp., Sunnyvale, Calif.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 628-638 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 21H

The stringent debris control requirements imposed on the design of the Space Shuttle booster separation motor are described along with the verification program implemented to ensure compliance with debris control objectives. The principal areas emphasized in the design and development of the Booster Separation Motor (BSM) relative to debris control were the propellant formulation and nozzle closures which protect the motors from aerodynamic heating and moisture. A description of the motor design requirements, the propellant formulation and verification program, and the nozzle closures design and verification are presented. Author

N85-16943*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITAL MANEUVERING SYSTEM DESIGN EVOLUTION c16
C. Gibson and C. Humphries *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 639-655 (For primary document see N85-16937

08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

Preliminary design considerations and changes made in the baseline space shuttle orbital maneuvering system (OMS) to reduce cost and weight are detailed. The definition of initial subsystem requirements, trade studies, and design approaches are considered. Design features of the engine, its injector, combustion chamber, nozzle extension and bipropellant valve are illustrated and discussed. The current OMS consists of two identical pods that use nitrogen tetroxide (NTO) and monomethylhydrazine (MMH) propellants to provide 1000 ft/sec of delta velocity for a payload of 65,000 pounds. Major systems are pressurant gas storage and control, propellant storage supply and quantity measurement, and the rocket engine, which includes a bipropellant valve, an injector/thrust chamber, and a nozzle. The subsystem provides orbit insertion, circularization, and on orbit and deorbit capability for the shuttle orbiter. A.R.H.

N85-16944*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DESIGN EVOLUTION OF THE ORBITER REACTION CONTROL SUBSYSTEM c16
Ralph J. Taeber, W. Karakulko, D. Belvins, C. Hohmann, and J. Henderson *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 656-672 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

The challenges of space shuttle orbiter reaction control subsystem development began with selection of the propellant for the subsystem. Various concepts were evaluated before the current Earth storable, bipropellant combination was selected. Once that task was accomplished, additional challenges of designing the system to satisfy the wide range of requirements dictated by operating environments, reusability, and long life were met. Verification of system adequacy was achieved by means of a combination of analysis and test. The studies, the design efforts, and the test and analysis techniques employed in meeting the challenges are described. Author

N85-16945*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE ORBITER AUXILIARY POWER UNIT DEVELOPMENT CHALLENGES c16
Renee Lance and Dwayne Weary *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 673-689 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

When the flying spacecraft was approved for development, a power unit for the hydraulic system had to be developed. Unlike other systems on the orbiter, there was no precedent in earlier spacecraft for a hydraulic system nor for the power unit to drive the hydraulic pumps. The only prototypes available were airplane auxiliary power units (APU), which were not required to operate in the severe environments of a spacecraft nor to have the longevity of an orbiter hydraulic power unit. The challenge was to build a hydraulic power unit which could operate in 0g or 3g, in a vacuum or at sea level pressure, and at -65 F or 225 F, which would be capable of restarting while hot, and which would be capable of sustaining the hydraulic loads for the life of the orbiter. The basic approach to providing hydraulic power for the orbiter was to use a small, high speed, monopropellant fueled turbine power unit to drive a conventional aircraft type hydraulic pump. The stringent requirements imposed on the orbiter APU quickly made this machine different from existing aircraft APUs. A.R.H.

N85-16946*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE SOLID ROCKET BOOSTER AUXILIARY POWER UNIT: MEETING THE CHALLENGE c16
Robert W. Hughes *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 690-701 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

The thrust vector control systems of the solid rocket boosters are turbine-powered, electrically controlled hydraulic systems which function through hydraulic actuators to gimbal the nozzles of the solid rocket boosters and provide vehicle steering for the Space Shuttle. Turbine power for the thrust vector control systems is provided through hydrazine fueled auxiliary power units which drive the hydraulic pumps. The solid rocket booster auxiliary power unit resulted from trade studies which indicated significant advantages would result if an existing engine could be found to meet the program goal of 20 missions reusability and adapted to meet the seawater environments associated with ocean landings. During its maturation, the auxiliary power unit underwent many design iterations and provided its flight worthiness through full qualification programs both as a component and as part of the thrust vector control system. More significant, the auxiliary power unit has successfully completed six Shuttle missions. Author

N85-16947*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE ELECTRICAL POWER GENERATION AND REACTANT SUPPLY SYSTEM c16
William E. Simon *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 702-719 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A01/MF A01 CSCL 22B

The design philosophy and development experience of fuel cell power generation and cryogenic reactant supply systems are reviewed, beginning with the state of technology at the conclusion of the Apollo Program. Technology advancements span a period of 10 years from initial definition phase to the most recent space transportation system (STS) flights. The development program encompassed prototype, verification, and qualification hardware, as well as post-STS-1 design improvements. Focus is on the problems encountered, the scientific and engineering approaches employed to meet the technological challenges, and the results obtained. Major technology barriers are discussed, and the evolving technology development paths are traced from their conceptual beginnings to the fully man-rated systems which are now an integral part of the shuttle vehicle. A.R.H.

N85-16948*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE S-BAND COMMUNICATIONS TECHNICAL CONCEPTS c32
J. W. Seyl, W. W. Seibert, J. A. Porter, D. S. Eggers, S. W. Novosad, H. A. Vang, S. D. Lenett, W. A. Lewton, and J. F. Pawlowski *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 720-756 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 17B

Using the S-band communications system, shuttle orbiter can communicate directly with the Earth via the Ground Spaceflight Tracking and Data Network (GSTDN) or via the Tracking and Data Relay Satellite System (TDRSS). The S-band frequencies provide the primary links for direct Earth and TDRSS communications during all launch and entry/landing phases of shuttle missions. On orbit, S-band links are used when TDRSS Ku-band is not available, when conditions require orbiter attitudes unfavorable to Ku-band communications, or when the payload bay doors are closed. the S-band communications functional requirements, the orbiter hardware configuration, and the NASA S-band communications network are described. The requirements and implementation concepts which resulted in techniques for shuttle S-band hardware development discussed include: (1) digital voice delta modulation; (2) convolutional coding/Viterbi decoding; (3) critical modulation index for phase modulation using a Costas loop (phase-shift keying) receiver; (4) optimum digital data modulation parameters for continuous-wave frequency modulation; (5) intermodulation effects of subcarrier ranging and time-division multiplexing data channels; (6) radiofrequency coverage; and (7) despreading techniques under poor signal-to-noise conditions. Channel performance is reviewed. A.R.H.

N85-16949*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

SHUTTLE Ku-BAND COMMUNICATIONS/RADAR TECHNICAL CONCEPTS c32

J. W. Griffin, J. S. Kelley, A. W. Steiner, H. A. Vang, W. E. Zrubek, and G. K. Huth (Axiomatix Corp., Los Angeles, Calif.) *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 757-766 refs (For primary document see N85-16937 08-12)

Avail: NTIS HC A23/MF A01 CSCL 17B

Technical data on the Shuttle Orbiter K sub u-band communications/radar system are presented. The more challenging aspects of the system design and development are emphasized. The technical problems encountered and the advancements made in solving them are discussed. The radar functions are presented first. Requirements and design/implementation approaches are discussed. Advanced features are explained, including Doppler measurement, frequency diversity, multiple pulse repetition frequencies and pulse widths, and multiple modes. The communications functions that are presented include advances made because of the requirements for multiple communications modes. Spread spectrum, quadrature phase shift keying (QPSK), variable bit rates, and other advanced techniques are discussed. Performance results and conclusions reached are outlined. B.W.

N85-16950*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

SHUTTLE PAYLOAD S-BAND COMMUNICATIONS SYSTEM c32

Bartus H. Batson, William E. Teasdale, James F. Pawlowski, and Oron L. Schmidt *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 767-776 refs (For primary document see N85-16937 08-12)

Avail: NTIS HC A23/MF A01 CSCL 17B

The Shuttle payload S-band communications system design, operational capabilities, and performance are described in detail. System design requirements, overall system and configuration and operation, and laboratory/flight test results are presented. Payload communications requirements development is discussed in terms of evolvement of requirements as well as the resulting technical challenges encountered in meeting the initial requirements. Initial design approaches are described along with cost-saving initiatives that subsequently had to be made. The resulting system implementation that was finally adopted is presented along with a functional description of the system operation. A description of system test results, problems encountered, how the problems were solved, and the system flight experience to date is presented. Finally, a summary of the advancements made and the lessons learned is discussed. Author

N85-16951*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

TDRSS S-SHUTTLE UNIQUE RECEIVER EQUIPMENT c32

Aaron Weinberg (Stanford Telecommunications, Inc., McLean, Va.), John J. Schwartz, and Robert Spearing *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 777-786 refs (For primary document see N85-16937 08-12)

Avail: NTIS HC A23/MF A01 CSCL 17B

Beginning with STS-9, the Tracking and Date Relay Satellite system (TDRSS) will start providing S- and Ku-band communications and tracking support to the Space Shuttle and its payloads. The most significant element of this support takes place at the TDRSS White Sands Ground Terminal, which processes the Shuttle return link S- and Ku-band signals. While Ku-band hardware available to other TDRSS users is also applied to Ku-Shuttle, stringent S-Shuttle link margins have precluded the application of the standard TDRSS S-band processing equipment to S-Shuttle. It was therfore found necessary to develop a unique S-Shuttle Receiver that embodies state-of-the-art digital technology and processing techniques. This receiver, developed by Motorola, Inc., enhances link margins by 1.5 dB relative to the standard S-band equipment and its bit error rate performance is within a few tenths of a dB of theory. An overview description of the Space Shuttle Receiver Equipment (SSRE) is presented which includes the presentation of block diagrams and salient design features. Selected, measured performance results are also presented. B.W.

N85-16952*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

THE COMMUNICATIONS LINK ANALYSIS AND SIMULATION SYSTEM (CLASS) c32

Robert D. Godfrey *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 787-797 (For primary document see N85-16937 08-12)

Avail: NTIS HC A23/MF A01 CSCL 17B

The Communications Link Analysis and Simulation System (CLASS) is a comprehensive, computerized communications and tracking system analysis tool under development by the Networks Directorate of the NASA/GSFC. The primary use of this system is to provide the capability to predict the performance of the Tracking and Data Relay Satellite system (TDRSS) User Communications and Tracking links through the TDRSS. The general capabilities and operational philosophy of the current and final versions of the CLASS are described along with some examples of analyses which have been performed utilizing the capabilities of this system. B.W.

N85-16953*# LinCom Corp., Los Angeles, Calif.

MODELING TECHNIQUES USED IN THE COMMUNICATIONS LINK ANALYSIS AND SIMULATION SYSTEM (CLASS) c32

Walter R. Braun and Teresa M. McKenzie *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 798-803 refs (For primary document see N85-16937 08-12) (Contracts NAS5-27240; NAS4-25681; NAS5-23591)

Avail: NTIS HC A23/MF A01 CSCL 17B

CLASS (Communications Link Analysis and Simulation System) is a software package developed for NASA to predict the communication and tracking performance of the Tracking and Data Relay Satellite System (TDRSS) services. The modeling techniques used in CLASS are described. The components of TDRSS and the performance parameters to be computed by CLASS are too diverse to permit the use of a single technique to evaluate all performance measures. Hence, each CLASS module applies the modeling approach best suited for a particular subsystem and/or performance parameter in terms of model accuracy and computational speed. B.W.

N85-16954*# LinCom Corp., Los Angeles, Calif.

VALIDATION OF THE COMMUNICATIONS LINK ANALYSIS AND SIMULATION SYSTEM (CLASS) c32

Walter R. Braun and Teresa M. McKenzie *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 804-809 refs (For primary document see N85-16937 08-12) (Contracts NAS5-27240; NAS5-25681; NAS5-23591)

Avail: NTIS HC A23/MF A01 CSCL 17B

CLASS (Communication Link Analysis and Simulation System) is a software package developed for NASA to predict the communication and tracking performance of the Tracking and Data Relay Satellite System (TDRSS) services. The methods used to verify CLASS are described. The usefulness of a software tool such as CLASS depends strongly on the reliability and accuracy of the results it produces. For this reason, considerable attention was paid to validation throughout the CLASS development. B.W.

N85-16955*# LinCom Corp., Los Angeles, Calif

THE STATISTICAL LOOP ANALYZER (SLA) c19

William C. Lindsey *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 810-814 (For primary document see N85-16937 08-12)

(Contract NAS9-16691)

Avail: NTIS HC A23/MF A01 CSCL 01D

The statistical loop analyzer (SLA) is designed to automatically measure the acquisition, tracking and frequency stability performance characteristics of symbol synchronizers, code synchronizers, carrier tracking loops, and coherent transponders. Automated phase lock and system level tests can also be made using the SLA. Standard baseband, carrier and spread spectrum modulation techniques can be accommodated. Through the SLA's phase error jitter and cycle slip measurements the acquisition and tracking thresholds of the unit under test are determined; any

false phase and frequency lock events are statistically analyzed and reported in the SLA output in probabilistic terms. Automated signal drop out tests can be performed in order to trouble shoot algorithms and evaluate the reacquisition statistics of the unit under test. Cycle slip rates and cycle slip probabilities can be measured using the SLA. These measurements, combined with bit error probability measurements, are all that are needed to fully characterize the acquisition and tracking performance of a digital communication system. M.G.

N85-16956*# LinCom Corp., Los Angeles, Calif.
DIGITAL SCRAMBLING FOR SHUTTLE COMMUNICATION LINKS: DO DRAWBACKS OUTWEIGH ADVANTAGES? c32
Khaled Dessouky *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 815-820 refs (For primary document see N85-16937 08-12)
(Contract NAS5-27240)
Avail: NTIS HC A23/MF A01 CSCL 17B

Digital data scrambling has been considered for communication systems using NRZ (non-return to zero) symbol formats. The purpose is to increase the number of transitions in the data to improve the performance of the symbol synchronizer. This is accomplished without expanding the bandwidth but at the expense of increasing the data bit error rate (BER). Models for the scramblers/descramblers of practical interest are presented together with the appropriate link model. The effects of scrambling on the performance of coded and uncoded links are studied. The results are illustrated by application to the Tracking and Data Relay Satellite System links. Conclusions regarding the usefulness of scrambling are also given. Author

N85-16957*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NOVEL APPLICATIONS OF THE NASA/GSFC VITERBI DECODER HARDWARE SIMULATOR c32
Dirk J. M. Walvis (Stanford Telecommunication, Inc., McLean, Va.), Aaron Weinberg (Stanford Telecommunication, Inc., McLean, Va.), Denver W. Herr, and John J. Schwartz *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 821-830 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 17B

The NASA/GSFC developed an all digital, real time, programmable Viterbi decoder simulator operating at rates up to 6 Msps. With this simulator, the bit error rate (BER) performance of convolutionally encoded/Viterbi decoded Shuttle-TDRSS return link channels under pulsed radio frequency interference (RFI) conditions has been predicted. The principles of the simulator are described with special emphasis on the channel simulator and the essential interaction between CLASS software and the simulator. The sensitivity of coded BER as function of several illustrative RFI parameters is discussed for two typical Shuttle-TDRSS return link configurations. M.G.

N85-16958*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ELECTRONICS SYSTEMS TEST LABORATORY TESTING OF SHUTTLE COMMUNICATIONS SYSTEMS c32
C. Jack Stoker and Linda K. Bromley *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 831-849 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 17B

Shuttle communications and tracking systems space to space and space to ground compatibility and performance evaluations are conducted in the NASA Johnson Space Center Electronics Systems Test Laboratory (ESTL). This evaluation is accomplished through systems verification/certification tests using orbiter communications hardware in conjunction with other shuttle communications and tracking external elements to evaluate end to end system compatibility and to verify/certify that overall system performance meets program requirements before manned flight usage. In this role, the ESTL serves as a multielement major ground test facility. The ESTL capability and program concept are discussed. The system test philosophy for the complex communications channels is described in terms of the major phases. Results of space to space and space to ground systems tests are presented. Several examples of the ESTL's unique capabilities to locate and help resolve potential problems are discussed in detail. M.G.

N85-16959*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER WHEEL AND TIRE CERTIFICATION c16
Carlisle C. Campbell, Jr. *In its* Space Shuttle Tech. Cpnf., Pt. 2 Jan. 1985 p 850-856 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

The orbiter wheel and tire development has required a unique series of certification tests to demonstrate the ability of the hardware to meet severe performance requirements. Early tests of the main landing gear wheel using conventional slow roll testing resulted in hardware failures. This resulted in a need to conduct high velocity tests with crosswind effects for assurance that the hardware was safe for a limited number of flights. Currently, this approach and the conventional slow roll and static tests are used to certify the wheel/tire assembly for operational use. Author

N85-16960*# Goodrich (B. F.) Co., Akron, Ohio.
THE SPACE SHUTTLE PROGRAM FROM CHALLENGE TO ACHIEVEMENT: SPACE EXPLORATION ROLLING ON TIRES c16
G. L. Felder *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 857-860 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

The Space Shuttle Transportation System is the first space program to employ the pneumatic tire as a part of space exploration. For aircraft tires, this program establishes new expectations as to what constitutes acceptable performance within a set of tough environmental and operational conditions. Tire design, stresses the usual low weight, high load, high speed, and excellent air retention features but at extremes well outside industry standards. Tires will continue to be an integral part of the Shuttle's landing phase in the immediate future since they afford a unique combination of directional control, braking traction, flotation and shock absorption not available by other systems. R.F.J.

N85-16961*# Rockwell International Corp., Downey, Calif.
SPACE SHUTTLE ELEVON SEAL PANEL MECHANISM c16
John G. Ripley *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 861-871 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

The orbiter elevon seal panel mechanism controls the position of fairing panels between the orbiter wing and elevon. Early mechanism designs used linkages which approximately matched the panel motion to elevon position, depending on panel deflections to maintain sealing. These linkages were refined during orbiter development to match panel motion to elevon motion more exactly, thus reducing panel deflections, loads, and weight. Changes to the adjacent cove seal resulted in the use of curved tension compression links. Mechanism temperatures up to 750 F (locally) posed difficulties in bearing lubrication. Despite the adverse effect of the many fabrication tolerances, the system successfully prevented the entry of 1200 F hot gases into the wing/elevon joint. R.J.F.

N85-16962*# Rockwell International Corp., Downey, Calif.
SPACE SHUTTLE WHEELS AND BRAKES c16
Renton B. Carsley *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 872-882 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

The Space Shuttle Orbiter wheels were subjected to a combination of tests which are different than any previously conducted in the aerospace industry. The major testing difference is the computer generated dynamic landing profiles used during

the certification process which subjected the wheels and tires to simulated landing loading conditions. The orbiter brakes use a unique combination of carbon composite linings and beryllium heat sink to minimize weight. The development of a new lining retention method was necessary in order to withstand the high temperature generated during the braking roll. As with many programs, the volume into which this hardware had to fit was established early in the program, with no provisions made for growth to offset the continuously increasing predicted orbiter landing weight. R.J.F.

N85-16963*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE SPACE SHUTTLE ORBITER REMOTE MANIPULATOR POSITIONING MECHANISM **c16**
J. H. Hardee *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 883-891 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

The major subassemblies of the Manipulator Positioning Mechanism (MPM) are described and illustrated. The Space Shuttle Orbiter design provides that the MPM may be mounted on either left or right sides of the payload bay, or both sides if two are flown. This MPM is provided for the purpose of securing the remote arm in stowed position during lift-off, boost, and landing. It also provides the deploy, latch and unlatch capabilities of the Remote Manipulator System arm. R.J.F.

N85-16964*# Spar Aerospace Ltd., Toronto (Ontario).
AN OVERVIEW OF THE SPACE REMOTE MANIPULATOR SYSTEM **c16**
T. H. Ussher and K. H. Doetach *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 892-904 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

An overview of the system requirements and performance of the Shuttle Remote Manipulator System (SRMS) is given. Data on some of the mechanical design considerations that were necessary during the development program are presented. The operational success of both the Orbiter and the SRMS during flights of Space Transportation System-2, -3, and -4 is ample evidence that the SRMS performed as expected and as desired. While some minor improvements were made in the follow-on production systems, one of which was delivered and two of which are currently under construction, the system design did not change significantly. Thus, information given is applicable to all the manipulator systems. R.J.F.

N85-16965*# Sundstrand Advanced Technology Group, Rockford, Ill.
SPACE SHUTTLE RUDDER/SPEEDBRAKE ACTUATION SUBSYSTEM **c16**
Ruth A. Naber *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 905-909 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

The Rudder/Speedbrake (R/SB) Actuation Subsystem for use on the NASA Space Shuttle Orbiter is an electro-hydro-mechanical system which provides the control and positionary capability of the orbiter aero-dynamic primary flight control surface. The system is located in the vehicle's vertical stabilizer. The geared rotary actuators provide a power hinge feature of the split panel rudder. Actuation of both panels in the same direction provides conventional rudder control; actuating the panels differentially provides a speedbrake function intended to control both speed and pitch. The commands may be superimposed on one another. The system consists of one power drive unit which responds to quadredundant avionic signals to generate a rotary output, four geared rotary actuators, which develop rotary position and torque as outputs, and ten torque transmitting drive-shifts. R.J.F.

N85-16966*# Sundstrand Advanced Technology Group, Rockford, Ill.
DEVELOPMENT OF THE SPACE SHUTTLE BODY FLAP ACTUATION SUBSYSTEM **c16**
Clifton R. Boggs *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 910-919 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

Development of the Body Flap Actuation Subsystem for Space Shuttles included alterations from the original design to mechanical stops, planet gears, control valves, and solenoid valves. The mechanical stops were redesigned to absorb stall load and rotating inertia of the hydraulic motors instead of only stall load. The institution of a quill shaft (torsion spring) was a successful solution. The planet gears in the geared rotary actuators developed cracks during testing. This failure was alleviated via modification to the gears. A motor pressurization - brake release timing technique was developed thru analysis and testing. This resulted in a control valve configuration which would not permit freewheeling of the body flap surface. Finally, several solenoid valve configurations were tested to obtain the desired performance. Conceptual redesigns and modifications were weighted against each other to optimize a solution. Tradeoffs were usually made between life, performance, failure tolerance, and reliability versus weight, envelope, and maintainability. R.J.F.

N85-16967*# Reynolds, Smith and Hills, Jacksonville, Fla.
MECHANICAL FEATURES OF THE SHUTTLE ROTATING SERVICE STRUCTURE **c16**
John M. Crump *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 920-934 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

With the development of the space shuttle launching facilities, it became mandatory to develop a shuttle rotating service structure to provide for the insertion and/or removal of payloads at the launch pads. The rotating service structure is a welded tubular steel space frame 189 feet high, 65 feet wide, and weighing 2100 tons. At the pivot column the structure is supported on a 30 inch diameter hemispherical bearing. At the opposite terminus the structure is supported on two truck assemblies each having eight 36 inch diameter double flanged wheels. The following features of the rotating service structure are discussed: (1) thermal expansion and contraction; (2) hurricane tie downs; (3) payload changeout room; (4) payload ground handling mechanism; (5) payload and orbiter access platforms; and (6) orbiter cargo bay access. R.S.F.

N85-16968*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER PROCESSING FACILITY: ACCESS PLATFORMS KENNEDY SPACE CENTER, FLORIDA, FROM CHALLENGE TO ACHIEVEMENT **c14**
Michael Haratunian (Seelye, Stevenson, Value & Knecht) *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 935-941 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22D

A system of access platforms and equipment within the space shuttle orbiter processing facility at Kennedy Space Center is described. The design challenges of the platforms, including clearance envelopes, load criteria, and movement, are discussed. Various applications of moveable platforms are considered. R.S.F.

N85-16969*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
EXTERNAL TANK GH2 VENT ARM **c16**
Garland E. Reichle and Charles W. Glassburn (Planning Research Corp., Kennedy Space Center, Fla.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 942-951 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

Because the venting of free hydrogen gas to the atmosphere presents an extremely hazardous situation, it was necessary to devise a means for safe, controlled venting of the shuttle external tank gaseous hydrogen during and after liquid hydrogen tank loading. Several design concepts that were considered initially were discarded as unfeasible because of vehicle weight restrictions,

high cost, and because the proposed structure was itself deemed a hazard due to the vehicle's nonvertical launch trajectory. These design concepts are discussed. A design employing a support structure/access arm attached to the fixed service structure was finally selected. The various design problems resolved included vent arm disconnect/drop interference, minimizing refurbishment due to launch damage, disconnect reliability, vehicle movement tracking, minimizing vent line pressure drop, and the presence of other vehicle services at the same centralized supply area. Six launches have proven the system to be reliable, efficient, and of nearly zero refurbishment cost. R.S.F.

N85-16970*# Planning Research Corp., Kennedy Space Center, Fla.
PAYLOAD TRANSPORTATION AT KSC c14
Michael E. Donahue *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 952-960 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22D

Cargo ground processing at John F. Kennedy Space Center (KSC) involves either a horizointal or vertical mode of assembly and processing of the STS payloads. Consequently, cargos are commonly referred to as horizontal or vertical payloads. The process flow for each mode requires different facilities and transportation requirements. Occasionally, a mixed mission cargo containing both horizontal and vertical payload elements will require a combination of horizontal and vertical transportation between facilities. Some of the engineering challenges and innovative solutions to satisy the unique on-site payload transportation requirements at KSC. In particular, some of the more demanding design requirements of the multiuse mission support equipment are presented, and the resulting engineering designs and unique solutions are outlined. Author

N85-16971*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
STS PAYLOAD GROUND HANDLING MECHANISM AT JOHN F. KENNEDY SPACE CENTER c14
Vincent Cassisi and Bemis C. Tatem, Jr. (Planning Research Corp., Kennedy Space Center, Fla.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 961-971 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22D

The payload ground handling mechanism (PGHM), which lifts payloads out of the payload canister that brings them to the launch pad, is described. The PGHM then loads the payloads into the orbiter through the open payload bay doors. The challenge was to provide this capability in time for space shuttle mission 31-A. Meeting this STS requirement was considerably more challenging than using the stacking method for loading payloads on top of expendable vehicles. The new mechanism and its main features are discussed. R.S.F.

N85-16972*# Connell Associates, Inc., Coral Gables, Fla.
THE ORBITER MATE/DEMATE DEVICE c14
Arthur J. Miller and William H. Binkley *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 972-985 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22D

The numerous components and systems of the space shuttle orbiter mate/demate device (MDD) are discussed. Special emphasis is given, mechanisms and mechanical systems to discuss in general their requirements, functions, and design; and, where applicable, to relate any unusual problems encountered during the initial concept studies, final design, and construction are discussed. The MDD and its electrical, machinery, and mechanical systems, including the main hoisting system, power operated access service platform, wind restrain and adjustment mechanism, etc., were successfully designed and constructed. The MDD was used routinely during the initial orbiter-747 approach and landing test and the more recent orbiter flight tests recovery and mate operations. Author

N85-16973*# Planning Research Corp., Kennedy Space Center, Fla.
COMPUTER AIDED PROCESSING USING LASER MEASUREMENTS c61
Richard M. Davis and John C. Koch *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 986-994 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 09B

The challenge exists of processing the STS and its cargo through KSC facilities in the most timely and cost effective manner possible. To do this a 3-D computer graphics data base was established into which was entered the STS, payloads, and KSC facilities. The facility drawing data are enhanced by laser theodolite measurements into an as-built configuration. Elements of the data base were combined to study orbiter/facility interfaces payload/facility access problems and design/arrangement of various GSE to support processing requirements. With timely analysis/design utilizing the 3-D computer graphics system, costly delays can be avoided. Better methodology can be analyzed to determine procedures for cost avoidance. R.S.F.

N85-16974*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
IN-FLIGHT TESTING OF THE SPACE SHUTTLE ORBITER THERMAL CONTROL SYSTEM c16
J. Thomas Taylor *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 995-1021 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

In-flight thermal control system testing of a complex manned spacecraft such as the space shuttle orbiter and the considerations attendant to the definition of the tests are described. Design concerns, design mission requirements, flight test objectives, crew vehicle and mission risk considerations, instrumentation, data requirements, and real-time mission monitoring are discussed. An overview of the tests results is presented. E.A.K.

N85-16975*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SHUTTLE SYSTEM ASCENT AERODYNAMIC AND PLUME HEATING c16
Lee D. Foster, Terry F. Greenwood, and Dorothy B. Lee *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1022-1029 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

The shuttle program provided a challenge to the aerothermodynamicist due to the complexity of the flow field around the vehicle during ascent, since the configuration causes multiple shock interactions between the elements. Wind tunnel tests provided data for the prediction of the ascent design heating environment which involves both plume and aerodynamic heating phenomena. The approach for the heating methodology based on ground test firings and the use of the wind tunnel data to formulate the math models is discussed. E.A.K.

N85-16976*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THERMAL DESIGN OF THE SPACE SHUTTLE SOLID ROCKET BOOSTER c20
Robert R. Fisher, Jerold L. Vaniman, and William J. Patterson *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1030-1040 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 20H

The thermal protection systems (TPS) to meet the quick turnaround and low cost required for reuse of the solid rocket booster (SRB) hardware. The TPS development considered the ease of application, changing ascent/reentry environments, and the problem of cleaning the residual insulation upon recovery. A sprayable ablator TPS material was developed. The challenges involved in design and development of this thermal system are discussed. E.A.K.

N85-16977*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THERMAL DESIGN OF THE SPACE SHUTTLE EXTERNAL TANK c16
Frederick D. Bachrtel, Jerold L. Vaniman, James M. Stuckey, Carroll Gray (Martin Marietta Corp., New Orleans, La.), and Bernard Widofsky (Martin Marietta Corp., New Orleans, La.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1041-1050 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

The shuttle external tank thermal design presents many challenges in meeting the stringent requirements established by the structures, main propulsion systems, and Orbiter elements. The selected thermal protection design had to meet these requirements, and ease of application, suitability for mass production considering low weight, cost, and high reliability. This development led to a spray-on-foam (SOFI) which covers the entire tank. The need and design for a SOFI material with a dual role of cryogenic insulation and ablator, and the development of the SOFI over SLA concept for high heating areas are discussed. Further issuses of minimum surface ice/frost, no debris, and the development of the TPS spray process considering the required quality and process control are examined. E.A.K.

N85-16978*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER ENTRY AEROTHERMODYNAMICS c02
Robert C. Ried *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1051-1061 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 01A

The challenge in the definition of the entry aerothermodynamic environment arising from the challenge of a reliable and reusable Orbiter is reviewed in light of the existing technology. Select problems pertinent to the orbiter development are discussed with reference to comprehensive treatments. These problems include boundary layer transition, leeward-side heating, shock/shock interaction scaling, tile gap heating, and nonequilibrium effects such as surface catalysis. Sample measurements obtained from test flights of the Orbiter are presented with comparison to preflight expectations. Numerical and wind tunnel simulations gave efficient information for defining the entry environment and an adequate level of preflight confidence. The high quality flight data provide an opportunity to refine the operational capability of the orbiter and serve as a benchmark both for the development of aerothermodynamic technology and for use in meeting future entry heating challenges. E.A.K.

N85-16979*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER THERMAL PROTECTION SYSTEM c16
Robert L. Dotts, Donald M. Curry, and Donald J. Tillian *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1062-1081 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

The major material and design challenges associated with the orbiter thermal protection system (TPS), the various TPS materials that are used, the different design approaches associated with each of the materials, and the performance during the flight test program are described. The first five flights of the Orbiter Columbia and the initial flight of the Orbiter Challenger provided the data necessary to verify the TPS thermal performance, structural integrity, and reusability. The flight performance characteristics of each TPS material are discussed, based on postflight inspections and postflight interpretation of the flight instrumentation data. Flights to date indicate that the thermal and structural design requirements for the orbiter TPS are met and that the overall performance is outstanding. E.A.K.

N85-16980*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE ON-ORBIT CONTAMINATION AND ENVIRONMENTAL EFFECTS c45
L. J. Leger, S. Jacobs, H. K. F. Ehlers, and E. Miller *In its* Space shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1082-1094 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 13B

Ensuring the compatibility of the space shuttle system with payloads and payload measurements is discussed. An extensive set of quantitative requirements and goals was developed and implemented by the space shuttle program management. The performance of the Shuttle system as measured by these requirements and goals was assessed partly through the use of the induced environment contamination monitor on Shuttle flights 2, 3, and 4. Contamination levels are low and generally within the requirements and goals established. Additional data from near-term payloads and already planned contamination measurements will complete the environment definition and allow for the development of contamination avoidance procedures as necessary for any payload. E.A.K.

N85-16981*# Wyle Labs., Inc., El Segundo, Calif.
COMMERCE LAB: MISSION ANALYSIS AND PAYLOAD INTEGRATION STUDY Interim Progress Report
6 Dec. 1984 91 p
(Contract NAS8-36109)
(NASA-CR-171272; NAS 1.26:171272) Avail: NTIS HC A05/MF A01 CSCL 22A

The needs of an aggressive commercial microgravity program are identified, space missions are defined, and infrastructural issues are identified and analyzed. A commercial laboratory, commerce lab, is conceived to be one or more an array of carriers which would fly aboard the space shuttle and accommodate microgravity science experiment payloads. Commerce lab is seen as a logical transition between currently planned space shuttle missions and future microgravity missions centered around the space station. R.S.F.

N85-16982*# Wyle Labs., Inc., Huntsville, Ala. Research and Engineering Div.
COMMERCE LAB: MISSION ANALYSIS. PAYLOAD INTEGRATION STUDY Monthly Progress Report
Gary D. Marvin Dec. 1984 5 p
(Contract NAS8-36109)
(NASA-CR-171285; NAS 1.26:171285) Avail: NTIS HC A02/MF A01 CSCL 22A

The objectives of the commerce lab mission analysis and payload integration study are discussed. A mission model which accommodates commercial users and provides a basic data base for future mission planning is described. The data bases developed under this study include: (1) user requirements; (2) apparatus capabilities and availabilities; and (3) carrier capabilities. These data bases are synthesized in a trades and analysis phase along with the STS flight opportunities. Optimum missions are identified. B.W.

N85-16983# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PLANNING FOR THE ON-ORBIT SERVICING OF MILITARY SPACECRAFT M.S. Thesis
M. E. Russell and R. M. Tayloe Sep. 1984 124 p
(AD-A148447; AFIT/GSM/LSY/84S-27) Avail: NTIS HC A06/MF A01 CSCL 22/2

On-orbit spacecraft servicing for military programs is examined. The military community appears to be somewhat reticent to embrace or, in some cases, to even consider on-orbit servicing. The civilian community appears enthusiastic about the potential of on-orbit servicing and the majority of economic studies of civilian missions show servicing strategies to be an attractive alternative to most expendable spacecraft strategies. A model called SATSERV is presented. This model can be used to conduct economic comparisons from an overall standpoint between expendable and servicing strategies. The model is implemented in a microcomputer spreadsheet format for rapid implementation and application along with ease of use by the manager. Four basic spreadsheet and mission scenarios are outlined and assumptions examined:

two low earth orbit mission profiles within the current STS operations envelope, one low earth orbit mission profile outside current STS operations capability and requiring a Teleoperator maneuvering System, and one geosynchronous mission scenario involving a space station and orbital transfer vehicle. GRA

N85-17010*# Martin Marietta Aerospace, Bethesda, Md.
SPACE BASED OTV SERVICING
J. Greg McAllister *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 255-272 refs Sponsored in part by Pratt and Whitney Aircraft (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22A

N85-17191# Joint Publications Research Service, Arlington, Va.
FRG STUDY LOOKS AT PARTICIPATION IN ESA, US SPACE STATION
Goetz Wange *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 1-3 Transl. into ENGLISH from Flugrev. (Munich), Oct. 1984 p 30-31 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N85-16984 Illinois Univ., Urbana-Champaign.
OPTIMAL MULTIPLE-IMPULSE NONLINEAR ORBITAL RENDEZVOUS Ph.D. Thesis
Jeng-Hua Chiu 1984 108 p
Avail: Univ. Microfilms Order No. DA8422037

A method for determining optimal impulsive trajectories is applied to minimum fuel, multiimpulse, circle to circle rendezvous for the fixed transfer time case. The optimal trajectory is assured by satisfying the Lawden's necessity conditions expressed in terms of the primer vector. Results are presented and compared to previously obtained linearized solutions to assess the accuracy of the linearized solutions. The optimal nonlinear multiimpulse fixed time cost is always equal to or lower than the optimal linearized cost. The effects of inclination of the target orbit and initial position of the target for different final orbit radii are also considered. Two, three and four impulse optimal solutions are obtained for the nonlinear case. Results are compared with known time open optimal solutions. Dissert. Abstr.

N85-16985# Royal Aircraft Establishment, Farnborough (England).
INDIVIDUAL GEOPOTENTIAL COEFFICIENTS OF ORDER 15 AND 30, FROM RESONANT SATELLITE ORBITS
D. G. King-Hele and Doreen M. C. Walker 28 Feb. 1984 34 p refs
(RAE-TR-84021; RAE-Space-636; BR92558) Avail: NTIS HC A03/MF A01

The analysis of variations in satellite orbits when they pass through 15th-order resonance (15 revolutions per day) yields values of lumped geopotential harmonics of order 15, and sometimes of order 30. The 15th-order lumped harmonics obtained from 24 such analyses over a wide range of orbital inclinations are used here to determine individual harmonic coefficients of order 15 and degree 15, 16,... 35; and the 30th-order lumped harmonics (from eight of the analyses) are used to evaluate individual coefficients of order 30 and degree 30, 32,... 40. The new values should be more accurate than any previously obtained. The accuracy of the 15th-order coefficients of degree 15, 16,... 23 is equivalent to 1 cm in geoid height, while the 30th-order coefficients of degree 30, 32 and 34 are determined with an accuracy which is equivalent to better than 2 cm in geoid height. The results are used to assess the accuracy of the Goddard Earth Model 10B.
Author (ESA)

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N85-16986# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
IMPACT OF ACTIVATION OPTIMIZATION ON THE VANDENBERG GROUND SUPPORT SYSTEM USING Q-GERT ANALYSIS M.S. Thesis
G. R. Benfield and C. J. Budinsky Sep. 1984 107 p
(AD-A148448; AFIT/GSM/LSY/84S-3) Avail: NTIS HC A06/MF A01 CSCL 22/4

The purpose of this thesis was to determine the impact of the changes made to the Vandenberg AFB (CA) Ground Support System by Activation Optimization; in particular determining the annual launch rate from the Vandenberg Launch Site. A simulation approach, using Q-GERT analysis, was taken to accomplish the research objective. A Q-GERT model of the Vandenberg Ground Support System was developed and, once validated, the output used to determine the annual launch rate. Analysis of these results indicated that the Ground Support System, as changed by Activation Optimization, would be able to meet the Air Force Program Management Directive (PMD) schedule for launches for the Vandenberg Launch Site. This analysis also revealed several potential bottlenecks in the system, identifying the launch pad as the primary constraint. Further sensitivity analysis indicated, however, that for the Vandenberg Launch Site to be able to meet higher launch rates than seven launches per year the physical expansion of certain facilities must be accomplished. Originator-supplied keywords include: Space shuttle, space transportation system, and space operations. GRA

N85-16968*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER PROCESSING FACILITY: ACCESS PLATFORMS KENNEDY SPACE CENTER, FLORIDA, FROM CHALLENGE TO ACHIEVEMENT
Michael Haratunian (Seelye, Stevenson, Value & Knecht) *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 935-941 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22D

N85-16970*# Planning Research Corp., Kennedy Space Center, Fla.
PAYLOAD TRANSPORTATION AT KSC
Michael E. Donahue *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 952-960 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22D

N85-16971*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
STS PAYLOAD GROUND HANDLING MECHANISM AT JOHN F. KENNEDY SPACE CENTER
Vincent Cassisi and Bemis C. Tatem, Jr. (Planning Research Corp., Kennedy Space Center, Fla.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 961-971 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22D

N85-16972*# Connell Associates, Inc., Coral Gables, Fla.
THE ORBITER MATE/DEMATE DEVICE
Arthur J. Miller and William H. Binkley *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 972-985 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22D

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N85-16987 Department of the Air Force, Washington, D.C.
LATERAL SUPPORT SYSTEM FOR CANISTER-LAUNCHED MISSILE Patent
W. E. Simon, inventor (to Air Force) Issued 14 Aug. 1984 4 p Supersedes AD-D010175
(AD-D011369; US-Patent-4,464,972; US-Patent-Appl-SN-475665)
Avail: US Patent and Trademark Office CSCL 16/1

A novel lateral support system for a canister launched missile is provided which is comprised of a plurality of long, narrow flexible pads of elastomer or like material disposed on the surface of said missile along a substantial lengthwise portion thereof and configured to substantially fill the annular gap between the missile and canister, each of said pads being hinged near the canister exit opening whereby the pads are peeled from the surface of the missile during launch thereof. Author (GRA)

N85-16988*# Eagle Engineering, Inc., Houston, Tex.
IMPACT OF LUNAR AND PLANETARY MISSIONS ON THE SPACE STATION Final Report
21 Nov. 1984 141 p refs
(Contract NAS9-17176)
(NASA-CR-171832; NAS 1.26:171832; Rept-84-85D) Avail: NTIS HC A07/MF A01 CSCL 22B

The impacts upon the growth space station of several advanced planetary missions and a populated lunar base are examined. Planetary missions examined include sample returns from Mars, the Comet Kopff, the main belt asteroid Ceres, a Mercury orbiter, and a saturn orbiter with multiple Titan probes. A manned lunar base build-up scenario is defined, encompassing preliminary lunar surveys, ten years of construction, and establishment of a permanent 18 person facility with the capability to produce oxygen propellant. The spacecraft mass departing from the space station, mission Delta V requirements, and scheduled departure date for each payload outbound from low Earth orbit are determined for both the planetary missions and for the lunar base build-up. Large aerobraked orbital transfer vehicles (OTV's) are used. Two 42 metric ton propellant capacity OTV's are required for each the the 68 lunar sorties of the base build-up scenario. The two most difficult planetary missions (Kopff and Ceres) also require two of these OTV's. An expendable lunar lander and ascent stage and a reusable lunar lander which uses lunar produced oxygen are sized to deliver 18 metric tons to the lunar surface. For the lunar base, the Space Station must hangar at least two non-pressurized OTV's, store 100 metric tons of cryogens, and support an average of 14 OTV launch, return, and refurbishment cycles per year. Planetary sample return missions require a dedicated quarantine module. R.S.F.

N85-16989*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OTV PROPULSION ISSUES
Washington Apr. 1984 296 p refs Conf. held in Cleveland, 3-4 Apr. 1984
(NASA-CP-2347; E-2171; NAS 1.55:2347) Avail: NTIS HC A13/MF A01 CSCL 22B

The statistical technology needs of aero-assist maneuvering, propulsion, and usage of cryogenic fluids were presented. Industry panels discussed the servicing of reusable space based vehicles and propulsion-vehicle interation. For individual titles, see N85-16990 through N85-17010.

N85-16990*# National Aeronautics and Space Administration, Washington, D. C.
NASA OAST PERSPECTIVE
Frank Stephenson *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 1-14 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

An advanced OTV is one of a number of advanced STS vehicles that the NASA OAST Space Systems Division Transportation Systems Office identified as candidates for future vehicle development. Vehicle requirements as well as technology needs and need dates were established and technology programs initiated to support those potential developments in a timely manner. It is assumed that advanced OTV will be space based and fully reusable for low cost operations, use aeroassist for return to low-Earth-orbit, and evolve to a man-rated system. The propulsion system will need to maintain high performance over a wide thrust range for mission flexibility, ranging from the transfer of large, acceleration limited structures from LEO to GEO, to demanding high reliability round-trip manned missions. Technology advances are needed in propulsion, aerobraking, low-gravity cryogenic fluid management, and in environmentally compatible, low-loss cryogenic tankage. In addition, diagnostic instrumentation for monitoring the health of on-board components and systems, and automated check-out capability will enhance low-cost space based OTV operations.
Author

N85-16991*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SHUTTLE/CENTAUR PROJECT PERSPECTIVE
Edwin T. Muckley *In its* OTV Propulsion Issues Apr. 1984 p 15-27 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

The shuttle/Centaur vehicle is being developed as an expendable, cryogenic high energy upper stage for use with the National Space Transportation System (NSTS). The stage is expected to meet the demands of a wide range of users. The shuttle/Centaur will be a modification of the highly successful Centaur stage, used extensively with the Atlas and Titan boosters since 1966 to launch planetary, geosynchronous and Earth orbital missions. The design changes required for use with the NSTS are described. These are primarily related to: (1) tank resizing to take advantage of the orbiter payload bay dimensions; (2) provisions for physically adopting Centaur to the orbiter; and, (3) accommodating safety requirements of the manned NSTS. The expected performance capabilities of two versions of the shuttle/Centaur are also described. The initial version, designated G-prime, is the larger of the two, with a length of about 9.1m (30 ft.). This vehicle will be used to launch the Galileo and International Solar Polar Mission to Jupiter in May 1986. B.G.

N85-16992*# National Aeronautics and Space Administration, Washington, D. C.
SPACE STATION TASK FORCE PERSPECTIVE
C. Hicks *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 29-40 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

Space station planning quidelines; architecture; functions; preliminary mission data base; scope for international and commercial participation; schedules; servicing capability; technology development; and space station program interfaces are discussed. B.G.

N85-16993*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PERFORMANCE ASSESSMENT OF AERO-ASSISTED ORBITAL TRANSFER VEHICLES
Richard W. Powell, Theodore A. Talay, Alan W. Wilhite, John J. Rehder, Nancy H. White, J. Chris Naftel, Howard W. Stone, James P. Arrington, and Ronald S. McCandless *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 41-56 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

Aero-assisted orbital transfer vehicles are analyzed. The aerodynamic characteristics over the flight profile and three- and six-degree-of-freedom performance analyses were determined. The important results, to date, are: (1) the aerodynamic preliminary

analysis system, an interactive computer program, used to predict the aerodynamics (performance, stability, and control) for these vehicles; (2) the performance capability, e.g., maximum inclination change, maximum heating rate, and maximum sensed acceleration, can be determined using continuum aerodynamics only; (3) guidance schemes can be developed that allow for errors in atmospheric density prediction, mispredicted trim angle of attack, and off-nominal atmospheric interface conditions, even for vehicles with a low lift-to-drag ratio; and (4) multiple pass trajectories can be used to reduce the maximum heating rate. B.G.

N85-16994*# Boeing Aerospace Co., Seattle, Wash.
LOW LIFT-TO-DRAG AERO-ASSISTED ORBIT TRANSFER VEHICLES
Dana G. Andrews and Richard T. Savage *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 57-68 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

The results of systems analysis conducted on low life drag ratio (L/D) aero-assisted orbit transfer vehicle (AOTV's) are presented. The objectives for this class of vehicle and formulate technology development plans and funding levels to bring the required technologies to readiness levels, as well as develop a credible decision data base encompassing the entire range of low L/D concepts for use in future NASA Aeroassist Orbit Transfer Vehicles studies. Each candidate low L/D concept, the aerobrake, the lifting brake, and the aeromaneuvering concept could be made to work with technologies achievable by the early 1990's. All concepts require flexible structure with flexible thermal protection system (TPS) to be successfully integrated into the shuttle orbiter for launch, all required improvements in guidance and control to fly the dispersed atmospheres at high altitude, and all concepts had potential to evolve from ground-based to space-based operations. B.G.

N85-16995*# Grumman Aerospace Corp., Bethpage, N.Y.
MODERATE LIFT-TO-DRAG AEROASSIST
Dwight E. Florence (General Electric Co., Philadelphia, Pa.) and Grahme Fischer *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 69-84 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

Significant performance benefits are realized via aerodynamic braking and/or aerodynamic maneuvering on return from higher altitude orbits to low Earth orbit. This approach substantially reduces the mission propellant requirements by using the aerodynamic drag, D, to brake the vehicle to near circular velocity and the aerodynamic lift, L, to null out accumulated errors as well as change the orbital inclination to that required for rendezvous with the Space Shuttle Orbiter. Broad concept evaluations were performed and the technology requirements and sensitivities for aeroassisted OTV's over a range of vehicle hypersonic L/D from 0.75 to 1.5 were systematically identified and assessed. The aeroassisted OTV is capable of evolving from an initial delivery only system to one eventually capable of supporting manned roundtrip missions to geosynchronous orbit. Concept screening was conducted on numerous configurations spanning the L/D = 0.75 to 1.5 range, and several with attractive features were identified. Initial payload capability was evaluated for a baseline of delivery to GEO, six hour polar, and Molniya (12 hours x 63.4 deg) orbits with return and recovery of the aeroassist orbit transfer vehicle (AOTV) at LEO. Evolutionary payload requirements that were assessed include a GEO servicing mission (6K up and 2K return) and a manned GEO mission (14K roundtrip). B.G.

N85-16996*# Boeing Co., Seattle, Wash.
BENEFITS OF HIGH AERODYNAMIC EFFICIENCY TO ORBITAL TRANSFER VEHICLES
D. G. Andrews, R. B. Norris (Air Force Wright Aeronautical Labs.), and S. W. Paris *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 85-96 refs Sponsored in part by Air Force (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

The benefits and costs of high aerodynamic efficiency on aeroassisted orbital transfer vehicles (AOTV) are analyzed. Results show that a high lift to drag (L/D) AOTV can achieve significant velocity savings relative to low L/D aerobraked OTV's when traveling round trip between low Earth orbits (LEO) and alternate orbits as high as geosynchronous Earth orbit (GEO). Trajectory analysis is used to show the impact of thermal protection system technology and the importance of lift loading coefficient on vehicle performance. The possible improvements in AOTV subsystem technologies are assessed and their impact on vehicle inert weight and performance noted. Finally, the performance of high L/D AOTV concepts is compared with the performances of low L/D aeroassisted and all propulsive OTV concepts to assess the benefits of aerodynamic efficiency on this class of vehicle. Author

N85-16997*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OTV PROPULSION TECNOLOGY PROGRAMMATIC OVERVIEW
Larry P. Cooper *In its* OTV Propulsion Issues Apr. 1984 p 97-102 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

An advanced orbit transfer vehicles (OTV) which will be an integral part of the national space transportation system to carry men and cargo between low Earth orbit and geosynchronous orbit will perform planetary transfers and deliver large acceleration limited space structures to high Earth orbits is reviewed. The establishment of an advanced propulsion technology base for an OTV for the mid 1990's is outlined. The program supports technology for three unique engine concepts. Work is conducted to generic technologies which benefit all three concepts and specific technology which benefits only one of the concepts. Concept and technology definitions to identify propulsion innovations, and subcomponent research to explore and validate their potential benefits are included. E.A.K.

N85-16998*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DRIVES AND BENEFITS OVERVIEW
S. D. McIntyre *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 103-112 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

The major technology issues for an advanced orbital transfer vehicles (OTV) engine to be used in conjunction with a space based, reusable orbit transfer vehicle are discussed. The results of the space station studies as they relate to the OTV and the ground rules and guidelines for a reusable OTV vehicle study are reviewed. The technology drives and benefit categories such as mission versatility, increased reliability or reduced cost are presented. The technology drivers and the associated benefits are covered with regard to relative significance and impact on the ongoing OTV engine technology program. It is recommended that because of the broad range of mission requirements and the long term potential cost benefits a new engine is needed for the space based reusable OTV. E.A.K.

N85-16999*# Aerojet Technical Systems Co., Sacramento, Calif.
AEROJET ADVANCED ENGINE CONCEPT c20
L. Schoenman *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 113-125 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 20H

The future orbit transfer vehicle (OTV) requirements which dictate the need for a highly versatile, highly reliable, reusable propulsion module are discussed. To attain maximum operational economy, space-basing is essential. This requires a reusable, maintenance free engine. The design features of this space based engine are defined. A new engine cycle and its advantages allow all the maintenance goals to be attained. Rubbing contact and interpropellant seals and purges are eliminated when GO2 is used to drive the LO2 pump. The TPA design has only one moving part. The use of both GH2 and GO2 to drive the turbines lowers

the turbine temperatures in addition lower GH2 temperatures and pressures improve chamber cooling and longer life. The use of GO2 as a turbine drive fluid is addressed. Space based engines require an integrated control and health monitoring system to improve system reliability and eliminate all scheduled maintenance. It is concluded that all OTV propulsion requirements can be fulfilled with a single engine. The technological developments required to demonstrate that engine are outlined. E.A.K.

N85-17000*# Pratt and Whitney Aircraft, East Hartford, Conn.
ADVANCED OTV ENGINES AND ISSUES **c20**
J. R. Brown *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 127-134 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 20H

The propulsion system requirements of orbit transfer vehicles (OTV). A baseline expander cycle engine which will meet those requirements was defined. The principal characteristics of a baseline engine and some options which are available to accommodate OTV system optimization studies was discussed. Engine program issues which are dependent on the mission scenario and the vehicle system configuration are shown. The rationale for a new cryogenic OTV engine is summarized. E.A.K.

N85-17001*# Rocketdyne, Canoga Park, Calif.
ADVANCED OTV ENGINE CONCEPTS **c20**
A. T. Zachary *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 135-148 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

The results and status of engine technology efforts to date and related company funded activities are presented. Advanced concepts in combustors and injectors, high speed turbomachinery, controls, and high-area-ratio nozzles that package within a short length result is engines with specific impulse values 35 to 46 seconds higher than those now realized by operational systems. The improvement in life, reliability, and maintainability of OTV engines are important. E.A.K.

N85-17002*# Martin Marietta Aerospace, Denver, Colo.
EARTH-TO-ORBIT PROPELLANT TRANSPORTATION OVERVIEW **c16**
D. Fester *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 149-155 (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22A

The transportation of large quantities of cryogenic propellants which are needed to support Space Station/OTV operation is discussed. Two ways to send propellants into space are: transporting them in dedicated tankers or scavenging unused STS propellant. Scavenging propellant, both with and without an aft cargo carrier system is examined. An average of two to four flights per year can be saved by scavenging and manifesting propellant as payload. Addition of an aft cargo carrier permits loading closer to maximum, reduces the required number of flights, and reduces the propellant available for scavenging. Sufficient propellant remains, however, for OTV needs. E.A.K.

N85-17003*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PASSIVE STORAGE TECHNOLOGIES
Peter Kittel *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 157-164 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

Advances in storage technology and how passive techniques could be applied to the storage of propellants at the space station are described. The devices considered are passive orbital disconnect struts, cooled shield optimization, liftweight shields and catalytic converters. E.A.K.

N85-17004*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ACTIVE COOLING REQUIREMENTS FOR PROPELLANT STORAGE **c28**
Gail A. Klein *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 165-177 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 21I

Recent NASA and DOD mission models have indicated future needs for orbital cryogenic storage and supply systems. Two thermal control systems which show the greatest promise for improving propellant storage life were evaluated. One system was an open cycle thermodynamic vent type with a refrigeration system for partial hydrogen reliquefaction located at the LH2 tank and a vapor cooled shield for integrated and non-integrated tank designs to reduce boiloff. The other was a closed system with direct refrigeration at the LH2 tank. A reversed Brayton cycle unit was baselined for the propellant processor. It is concluded that: (1) reliquefaction systems are not attractive for minimizing propellant boiloff; (2) open cycle systems may not be economically attractive for long term storage; (3) a number of refrigeration systems are available to assist in the long term storage of cryogenic propellants; and (4) shields can significantly improve the performance of mechanical coolers. R.S.F.

N85-17005*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROPELLANT TRANSFER: ATTACHED DEPOT **c28**
Ralph N. Eberhardt *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 179-190 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 21I

Propellant transfer at an attached depot involves: (1) resupply tankers (dedicated launch from the ground or scavenging from the external tank) to resupply the depot; (2) depot storage and supply tanks (attached, free-flyer, or tethered) from which liquid hydrogen and liquid oxygen are transferred to fill the space-based OTV; and (3) the space-based OTV which is resupplied with cryogens from the depot. Liquid storage and supply, thermal control, and transfer/resupply requirements for an attached depot are listed, and technologies defined. The specific fluid management elements and approaches for an attached depot are enumerated. The cryogenic fluid management facility (CFMF) shuttle attached-payload test bed, scheduled for a mid-1988 first launch, is expected to provide much of the needed technology. Author

N85-17006*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PROPELLANT TRANSFER: TETHERED DEPOT **c28**
K. Kroll *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 191-206 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 21I

Spacebasing of orbital transfer vehicles at a space station requires a depot that safely and efficiently stores and transfers the resupply propellants. In order to transfer propellants, a method effectively acquire only liquid and vent only gas must exist. A method that produces a low gravity to settle propellants would bypass these weaknesses, while allowing ground-like operations. This low gravity can be passively produced using gravity gradient techniques. A satellite with a large length to diameter ratio, such as a depot attached to a space station with a tether, stabilizes along on Earth radial because of an outward acceleration proportional to the distance from the satellite's center of gravity. Analysis indicates that liquid can be setteled with relatively short tether lengths. The feasibility, design requirements, and operational limitations of a tethered refueling depot were investigated with special emphasis on slosh control. R.S.F.

N85-17007*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OTV FLUID MANGEMENT SYSTEMS **c28**
L. Hastings *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 207-228 refs (For primary document see N85-16989 08-15)

Avail: NTIS HC A13/MF A01 CSCL 21I

Design, performance, and technology issues associated with reduced gravity propellant management for orbital transfer vehicles (OTV's) are reviewed. The in-space cryogenic management state-of-technology significantly affects the overall confidence level associated with a resupply mission and propulsion performance. Cryogen resupply sequences, timelines, controls, and associated crew involvement are all affected by the technology state. Additionally, OTV propellant tankage configurations, tankage thermodynamic conditions, acceleration environment, propulsion interfaces, and instrumentation are significant factors. Basic propellant transfer phases examined that drive orbital servicing requirements include: (1) tankage preconditioning; (2) tankage chilldown; and (3) propellant fill. Propellant management support of the OTV propulsion phases includes engine restart requirements and orbital coast between engine burns. Technology activities in support of identified technology issues are reviewed. R.S.F.

N85-17008*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

VEHICLE/ENGINE INTEGRATION

L. P. Cooper, Tim Vinopal (Boeing Aerospace Co., Seattle), D. E. Florence (General Electric Corp., Fairfield, Conn.), Roy W. Michel (Aerojet TechSystems Co.), J. R. Brown (Pratt and Whitney Aircraft, East Hartford, Conn.), R. P. Bergeron (Rockwell International Corp., Pittsburg), and V. A. Weldon *In its* OTV Propulsion Issues Apr. 1984 p 229-245 refs (For primary document see N85-16989 08-15)

Avail: NTIS HC A13/MF A01 CSCL 22B

VEHICLE/ENGINE Integration Issues are explored for orbit transfer vehicles (OTV's). The impact of space basing and aeroassist on VEHICLE/ENGINE integration is discussed. The AOTV structure and thermal protection subsystem weights were scaled as the vehicle length and surface was changed. It is concluded that for increased allowable payload lengths in a ground-based system, lower length-to-diameter (L/D) is as important as higher mixture ration (MR) in the range of mid L/D ATOV's. Scenario validity, geometry constraints, throttle levels, reliability, and servicing are discussed in the context of engine design and engine/vehicle integration. R.S.F.

N85-17009*# Rockwell International Corp., Richardson, Tex.

ORBITAL TRANSFER VEHICLE PROPULSION ISSUES

R. P. Bergeron and V. A. Weldon *In* NASA. Lewis Research Center OTV propulsion Issues Apr. 1984 p 246-251 refs (For primary document see N85-16989 08-15)

Avail: NTIS HC A13/MF A01 CSCL 22B

The development of a reusable and space-based orbital transfer vehicle (OTV) necessitates an integral approach toward structural and propulsion subsystems design. A single engine installation necessitates moving the engine further aft and/or relocation of the engine gimbal point to accommodate vehicle control requirements. Penalties associated with gimbal point relocation without increasing stage length or modifying typical advanced engine concepts, as well as a method for minimizing such penalties, are presented for a single engine toroidal tank OTV configuration. Alternative integrated vehicle structure/engine concepts are also presented for multi-engine configurations. Features of these potential concepts are given which indicate the need for substantial additional study of feedline gimbal alternatives before firmly establishing advanced engine design. The issue of vehicle/engine integration is addressed in three areas: interfaces (physical and functional), installation requirements, and reliability apportionment (i.e., number of engines required to assure mission completion). R.S.F.

N85-17010*# Martin Marietta Aerospace, Bethesda, Md.

SPACE BASED OTV SERVICING c12

J. Greg McAllister *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 255-272 refs Sponsored in part by Pratt and Whitney Aircraft (For primary document see N85-16989 08-15)

Avail: NTIS HC A13/MF A01 CSCL 22A

Space based servicing of an orbit transfer vehicle (OTV) was previously outlined in sufficient detail to arrive at OTV and support system servicing requirements. Needed space station facilities and their functional requirements were identified. The impact of logistics and space serviceable design on the OTV design is detailed herein. RL10 derivative rocket engine inspection task times are enumerated. R.S.F.

N85-17011*# Boeing Aerospace Co., Seattle, Wash. Space Systems Div.

SPACE STATION NEEDS, ATTRIBUTES, AND ARCHITECTURAL OPTION STUDY Mid-Term Briefing

18 Nov. 1982 197 p Sponsored by NASA

(NASA-CR-174316; NAS 1.26:174316; D180-27305-1) Avail: NTIS HC A09/MF A01 CSCL 22B

Potential user interest and requirements for a manned space station are examined for space and applications missions, commercial missions, technology demonstration missions, space operations missions, and national security missions. Approaches to architectural options, candidate payloads, and technology drivers are considered. Mission imposed requirements for the space operations center are also considered. A.R.H.

N85-17012# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. d'Etudes et de Recherches en Technologie Spatiale.

SPACE ENVIRONMENT SIMULATION TO TEST SATELLITE THERMAL CONTROL COATINGS, VOLUME 1 Final Report [ESSAIS DE SIMULATION D'ENVIRONNEMENT SPATIAL SUR REVETEMENTS DE CONTROLE THERMIQUE DE SATELLITES, TOME 1]

M. Dutat, J. Marco, and A. Paillous Paris ESA Oct. 1983 138 p refs In FRENCH Report will also be announced as translation (ESA-TT-891-Vol-1) 3 Vol.

(Contracts ESTEC-4577/81/NL-DG; ESTEC-5144/82/NL-DG) (CERT-4128-Vol-1; ESA-CR(P)-1870-Vol-1) Avail: NTIS HC A07/MF A01

Optical solar reflector coatings were tested in a vacuum chamber by irradiation with electrons, protons and ultraviolet radiation to simulate 5 years of geostationary orbit. The effect of contamination from adhesive RTV 566 was studied to explain the performance degradation in OTS2 and other satellites. Optical reflectance was measured by spectrometers. The variation in solar absorption as a function of time is given for four types of coating material. The contaminated samples show a degradation of solar absorption three to four times larger than controls. Author (ESA)

N85-17013# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. d'Etudes et de recherches en Technologie Spatiale.

SPACE ENVIRONMENT SIMULATION TO TEST SATELLITE THERMAL CONTROL COATINGS. VOLUME 2: ANNEX 1 [ESSAIS DE SIMULATION D'ENVIRONMENT SPATIAL SUR REVETEMENTS DE CONTROLE THERMIQUE DE SATELLITES. TOME 2, ANNEXE 1]

Paris ESA 1983 137 p In FRENCH Report will also be announced as translation (ESA-TT-891-Vol-2) 3 Vol.

(Contracts ESTEC-4577/81/NL-DG; ESTEC-5144/82/NL-DG) (ESA-CR(P)-1870-Vol-2) Avail: NTIS HC A07/MF A01

Optical properties measured in situ at -35C and at various exposure stages up to one year are tabulated for thermal control coatings tested during space environment simulation. Results show: (1) spectral reflectance for 13 wavelengths; (2) variation with respect to the initial measurement, i.e., before irradiation and deposition; (3) solar reflectance including ultraviolet, visible, and infrared radiation, as well as the total spectrum (295 to 4,000 nm); (4) variations of solar reflectance with respect to initial values; (5) solar absorptance (calculated as a complement at 1.00 of solar reflectance in the same wavelength domain); and (6) variations of these solar reflectances with respect to initial values. Transl. by A.R.H.

N85-17014# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. d'Etudes et de Recherches en Technologie Spatiale.
SPACE ENVIRONMENT SIMULATION TO TEST SATELLITE THERMAL CONTROL COATINGS. VOLUME 2: ANNEXES 2, 3, 4 [ESSAIS DE SIMULATION D'ENVIRONMENT SPATIAL SUR REVETEMENTS DE CONTROLE THERMIQUE DE SATELLITES. TOME 2: ANNEXES 2, 3, 4]
Paris ESA 1983 259 p In FRENCH Report will also be announced as translation (ESA-TT-891-Vol-3) 3 Vol.
(Contracts ESTEC-4577/81/NL-DG; ESTEC-5144/82-NL-DG)
(ESA-CR(P)-1870-Vol-3) Avail: NTIS HC A12/MF A01

Initial and post irradiation measurements obtained under vacuum and at -35C are tabulated for satellite thermal control coatings. The measurements were obtained before deposition and at various periods after deposition up to 5.08 simulated years.
Transl. by A.R.H.

N85-17015# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
BOTANY FACILITY, PHASE A STUDY. PART 1: EXECUTIVE SUMMARY Final Report
B. Doll (Matra Espace, Paris-Velizy, France), A. Frey, and P. Schiller Paris ESA 10 Oct. 1983 80 p
(Contract ESA-5282/82/F-FC(SC))
(BF-DOC-10-Vol-1; ESA-CR(P)-1932) Avail: NTIS HC A05/MF A01

A facility for spaceborne botany experiments to be flown on the European Retrievable Carrier (EURECA) is proposed. Configuration and design, thermal control, electronics, subsystem design, add-on concepts and ground support equipment are described. The facility has 16 sample-containers at microgravity and 8 on the centrifuge. Containers are 50 x 50 x 150 mm and are observed by video and optical cine cameras. A controlled environment can be assured during 6 month operation. Author (ESA)

N85-17016# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
QUALIFICATION OF A HYDRAZINE GAS GENERATOR SYSTEM WITH ELECTROTHERMAL/CATALYTIC GAS GENERATOR Final Report, Jun. 1982
Hans-Dieter Schmitz Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 35 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-84-040; ISSN-0170-1339) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 7,50

A hydrazine gas generator system with catalytic gas generator was developed and its qualification for satellites was tested. An electrothermal gas generator was developed and tested. For the design of the gas generators EXOSAT demands were considered. Functional tests, environmental and life tests of the catalytic gas generator system show its suitability for attitude control of satellites and sondes. Author (ESA)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N85-16898*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
INTEGRATION OF GROUND AND ON-BOARD SYSTEM FOR TERMINAL COUNT
Charles A. Abner and Don H. Townsend *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 81-86 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16900*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
AUTOMATION OF CHECKOUT FOR THE SHUTTLE OPERATIONS ERA
Judith A. Anderson and Kenneth O. Hendrickson *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 97-101 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16904*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE HANDLING QUALITIES
David W. Gilbert *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 137-142 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16905*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LOW-SPEED LONGITUDINAL ORBITER QUALITIES
Bruce G. Powers *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 143-150 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 01C

N85-16906*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE SPACE SHUTTLE ASCENT VEHICLE AERODYNAMIC CHALLENGES CONFIGURATION DESIGN AND DATA BASE DEVELOPMENT
Charlie C. Dill, J. C. Young, B. B. Roberts, M. K. Craig, J. T. Hamilton (Rockwell International Corp., Downey, Calif.), and W. W. Boyle (Lockheed Missiles and Space Co., Huntsville, Ala.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 157-176 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16907*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE SPACE SHUTTLE LAUNCH VEHICLE AERODYNAMIC VERIFICATION CHALLENGES
R. O. Wallace, L. D. Austin, J. G. Hondros, T. E. Surber (Rockwell International Corp., Downey, Calif.), L. M. Gaines (Rockwell International Corp., Downey, Calif.), and J. T. Hamilton (Rockwell International Corp., Downey, Calif.) *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 177-188 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16908*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE AERODYNAMIC CHALLENGES OF SRB RECOVERY
D. L. Bacchus, D. A. Kross, and R. D. Moog (Martin Marietta Corp., Denver, Colo.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 189-208 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22A

N85-16909*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE AERODYNAMIC CHALLENGES OF THE DESIGN AND DEVELOPMENT OF THE SPACE SHUTTLE ORBITER
James C. Young, Jimmy M. Underwood, Ernest R. Hillje, Arthur M. Whitnah, Paul O. Romere, Joe D. Gamble, Barney -B. Roberts, George M. Ware, William I. Scallion, Bernard Spencer, Jr. et al *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 209-263 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16910*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE DEVELOPMENT AND APPLICATION OF AERODYNAMIC UNCERTAINTIES: AND FLIGHT TEST VERIFICATION FOR THE

SPACE SHUTTLE ORBITER
Joe D. Gamble, Douglas R. Cooke, Jimmy M. Underwood, Howard W. Stone, Jr., and Donald C. Schlosser (Rockwell International Corp., Downey, Calif.) *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 264-294 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16911*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AERODYNAMIC CHALLENGES OF ALT
Ivy Hooks, David Homan, and Paul Romere *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 295-312 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01

N85-16913*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE STRUCTURAL DYNAMICS CHARACTERISTICS: THE ANALYSIS AND VERIFICATION
c. Thomas Modlin, Jr. and George A. Zupp, Jr. *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 325-334 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16914*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
STRUCTURAL LOAD CHALLENGES DURING SPACE SHUTTLE DEVELOPMENT
Alden C. Mackey and Ralph E. Gatto (Rockwell International Corp., Downey, Calif.) *In its* Sapce Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 335-344 ref (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16915*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER STRUCTURAL DESIGN AND VERIFICATION
Philip C. Glynn and Thomas L. Moser *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 345-356 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16916*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE EXTERNAL TANK PERFORMANCE IMPROVEMENTS: THE CHALLENGE
Harold R. Coldwater, Richard R. Foll (Martin Marietta Corp., New Orleans, La.), Gayle J. Howell (Martin Marietta Corp., New Orleans, La.), and Jon A. Dutton (Martin Marietta Corp., New Orleans, La.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 357-364 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16917*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STRUCTURAL AND MECHANICAL DESIGN CHALLENGES OF SPACE SHUTTLE SOLID ROCKET BOOSTERS SEPARATION AND RECOVERY SUBSYSTEMS
William R. Woodis (Martin Marietta Corp., Denver, Colo.) and Roy E. Runkle *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 365-386 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22A

N85-16918*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SSME LIFETIME PREDICTION AND VERIFICATION, INTEGRATING ENVIRONMENTS, STRUCTURES, MATERIALS: THE CHALLENGE
Robert S. Ryan, Larry D. Salter, George M. Young, III, and Paul M. Munafo *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 386-402 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16919*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE CHALLENGING SCALES OF THE BIRD: SHUTTLE TILE STRUCTURAL INTEGRITY
William C. Schneider and Glenn J. Miller *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 403-413 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16920*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CHALLENGES IN THE DEVELOPMENT OF THE ORBITER ATMOSPHERE REVITALIZATION SUBSYSTEM
R. Norman Prince, Joe Swider (Hamilton Standard, Windsor Locks, Conn.), John Wojnarowski (Hamilton Standard, Windsor Locks, Conn.), Angelo Decrisantis (Hamilton Standard, Windsor Locks, Conn.), George R. Ord (Moog, Inc., East Aurora, N.Y.), James J. Walleshauser (Moog, Inc., East Aurora, N.Y.), and John W. Gibb (Rockwell International Corp., Downey, Calif.) *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 414-425 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 06K

N85-16925*# Vought Aeronautics, Dallas, Tex.
CHALLENGES IN THE DEVELOPMENT OF THE ORBITER RADIATOR SYSTEM
J. L. Williams, J. A. Oren, M. F. Modest (University of Southern California, Los Angeles), and H. R. Howell *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 480-489 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16927*# Martin Marietta Corp., Cocoa Beach, Fla.
EXTERNAL TANK PROCESSING FROM BARGE TO PAD
J. E. Carpenter *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 498-504 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16928*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
SOLID ROCKET BOOSTER RETRIEVAL OPERATIONS
Anker M. Rasmussen *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 505-509 ref (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16929*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE FLIGHT READINESS FIRING DRESS REHERSAL FOR STS-1
Warren L. Riles *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 510-524 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22B

N85-16930*# Rockwell International Corp., Cocoa Beach, Fla.
TRANSITION TO THE SPACE SHUTTLE OPERATIONS ERA
In NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 525-531 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22A

N85-16931*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
LAUNCH PROCESSING SYSTEM CONCEPT TO REALITY
William W. Bailey *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 532-538 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22D

N85-16933*# Martin Marietta Corp., Cocoa Beach, Fla.
MATHEMATICAL MODELS FOR SPACE SHUTTLE GROUND SYSTEMS
Edward G. Tory *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 551-557 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22D

N85-16935*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
SUPPORT SYSTEMS DESIGN AND ANALYSIS
Robert M. Ferguson *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 565-572 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 22D

N85-16943*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITAL MANEUVERING SYSTEM DESIGN EVOLUTION
C. Gibson and C. Humphries *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 639-655 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16944*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DESIGN EVOLUTION OF THE ORBITER REACTION CONTROL SUBSYSTEM
Ralph J. Taeber, W. Karakulko, D. Belvins, C. Hohmann, and J. Henderson *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 656-672 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16945*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE ORBITER AUXILIARY POWER UNIT DEVELOPMENT CHALLENGES
Renee Lance and Dwayne Weary *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 673-689 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16946*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE SOLID ROCKET BOOSTER AUXILIARY POWER UNIT: MEETING THE CHALLENGE
Robert W. Hughes *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 690-701 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16947*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE ELECTRICAL POWER GENERATION AND REACTANT SUPPLY SYSTEM
William E. Simon *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 702-719 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A01/MF A01 CSCL 22B

N85-16959*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER WHEEL AND TIRE CERTIFICATION
Carlisle C. Campbell, Jr. *In its* Space Shuttle Tech. Cpnf., Pt. 2 Jan. 1985 p 850-856 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16960*# Goodrich (B. F.) Co., Akron, Ohio.
THE SPACE SHUTTLE PROGRAM FROM CHALLENGE TO ACHIEVEMENT: SPACE EXPLORATION ROLLING ON TIRES
G. L. Felder *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 857-860 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16961*# Rockwell International Corp., Downey, Calif.
SPACE SHUTTLE ELEVON SEAL PANEL MECHANISM
John G. Ripley *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 861-871 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16962*# Rockwell International Corp., Downey, Calif.
SPACE SHUTTLE WHEELS AND BRAKES
Renton B. Carsley *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 872-882 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16963*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE SPACE SHUTTLE ORBITER REMOTE MANIPULATOR POSITIONING MECHANISM
J. H. Hardee *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 883-891 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16964*# Spar Aerospace Ltd., Toronto (Ontario).
AN OVERVIEW OF THE SPACE REMOTE MANIPULATOR SYSTEM
T. H. Ussher and K. H. Doetach *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 892-904 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16965*# Sundstrand Advanced Technology Group, Rockford, Ill.
SPACE SHUTTLE RUDDER/SPEEDBRAKE ACTUATION SUBSYSTEM
Ruth A. Naber *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 905-909 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16966*# Sundstrand Advanced Technology Group, Rockford, Ill.
DEVELOPMENT OF THE SPACE SHUTTLE BODY FLAP ACTUATION SUBSYSTEM
Clifton R. Boggs *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 910-919 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16967*# Reynolds, Smith and Hills, Jacksonville, Fla.
MECHANICAL FEATURES OF THE SHUTTLE ROTATING SERVICE STRUCTURE
John M. Crump *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 920-934 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16969*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
EXTERNAL TANK GH2 VENT ARM
Garland E. Reichle and Charles W. Glassburn (Planning Research Corp., Kennedy Space Center, Fla.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 942-951 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16974*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
IN-FLIGHT TESTING OF THE SPACE SHUTTLE ORBITER THERMAL CONTROL SYSTEM
J. Thomas Taylor *In its* Space Shuttle Tech. Conf., Pt. 2 Jan.

1985 p 995-1021 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16975*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SHUTTLE SYSTEM ASCENT AERODYNAMIC AND PLUME HEATING
Lee D. Foster, Terry F. Greenwood, and Dorothy B. Lee *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1022-1029 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16977*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THERMAL DESIGN OF THE SPACE SHUTTLE EXTERNAL TANK
Frederick D. Bachrtel, Jerold L. Vaniman, James M. Stuckey, Carroll Gray (Martin Marietta Corp., New Orleans, La.), and Bernard Widofsky (Martin Marietta Corp., New Orleans, La.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1041-1050 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-16979*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER THERMAL PROTECTION SYSTEM
Robert L. Dotts, Donald M. Curry, and Donald J. Tillian *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1062-1081 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22B

N85-17002*# Martin Marietta Aerospace, Denver, Colo.
EARTH-TO-ORBIT PROPELLANT TRANSPORTATION OVERVIEW
D. Fester *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 149-155 (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22A

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N85-17017# Department of the Navy, Washington, D. C.
A VARIABLE LENGTH AND SENSOR SPACING THERMISTOR ARRAY Patent Application
R. C. Swenson, inventor (to Navy) Filed 22 Feb. 1984 6 p
(AD-D011416; US-Patent-Appl-SN-582238) Avail: NTIS HC A02/MF A01 CSCL 09/6

An adaptable thermistor array of variable length and sensor spacing. A plurality of thermistor modules are attached at any desired interval to a braided line. Each thermistor module contains its own power source, sensor, and an acoustic telemetry transmitter to transmit the temperature related data from the module to an acoustic receiver in a buoy from which the line depends.
Author (GRA)

N85-17018# Department of the Army, Washington, D. C.
DUAL MODE SCANNER-TRACKER Patent Application
R. J. Mongeon, inventor (to Army) Filed 9 Nov. 1984 11 p
(AD-D011417; US-Patent-Appl-SN-669912) Avail: NTIS HC A02/MF A01 CSCL 17/7

The beam of a laser radar is moved over the field of view by means of a pair of scanner/trackers arranged in cascade along the laser beam. One of the scanner/trackers operates at high speed, with high resolution and a wide field and is located in the demagnified portion of the laser beam. The two scanner/trackers complement each other to achieve high speed, high resolution scanning as well as tracking of moving targets. A beam steering telescope for an airborne laser radar which incorporates the novel dual mode scanner/tracker is also shown. The other scanner/tracker operates at low speed with low resolution and a wide field and is located in the magnified portion of the laser beam. GRA

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N85-17019*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ANALYSIS OF NONVOLATILE RESIDUE (NVR) FROM SPACECRAFT SYSTEMS
Joe A. Colony Jan. 1985 12 p
(NASA-TM-86184; G-85F0284; NAS 1.15:86184) Avail: NTIS HC A02/MF A01 CSCL 07D

Organic contamination on critical spacecraft surfaces can cause electronic problems, serious attenuation of various optical signals, thermal control changes, and adhesion problems. Such contaminants can be detected early by the controlled use of witness mirrors, witness plates, wipe sampling, or direct solvent extraction. Each method requires careful control of variables of technique and materials to attain the ultimate sensitivities inherent to that procedure. Subsequent chemical analysis of the contaminant sample by infrared and mass spectrometry identifies the components, gives semiquantitative estimates of contaminant thickness, indicates possible sources of the nonvolatile residue (NVR), and provides guidance for effective cleanup procedures. Author

N85-17020*# Lockheed Missiles and Space Co., Palo Alto, Calif. Thermal Sciences Lab.
PASSIVE ORBITAL DISCONNECT STRUT (PODS 3) STRUCTURAL TEST PROGRAM
R. T. Parmley Jan. 1985 112 p refs
(Contract NAS2-10848)
(NASA-CR-177325; NAS 1.26:177325) Avail: NTIS HC A06/MF A01 CSCL 22B

A passive orbital disconnect strut (PODS-3) was analyzed structurally and thermally. Development tests on a graphite/epoxy orbit tube and S glass epoxy launch tube provided the needed data to finalize the design. A detailed assembly procedure was prepared. One strut was fabricated. Shorting loads in both the axial and lateral direction (vs. load angle and location) were measured. The strut was taken to design limit loads at both ambient and 78 K (cold end only). One million fatigue cycles were performed at predicted STS loads (half in tension, half in compression) with the cold end at 78 K. The fatigue test was repeated at design limit loads. Six struts were then fabricated and tested as a system. Axial loads, side loads, and simulated asymmetric loads due to temperature gradients around the vacuum shell were applied. Shorting loads were measured for all tests. Author

N85-17021*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPLORATORY INVESTIGATION OF THE AERODYNAMIC CHARACTERISTICS OF A BIWING VEHICLE AT MACH 20.3
Peter T. Bernot Feb. 1984 33 p refs
(NASA-TM-86314; L-15863; NAS 1.15:86314) Avail: NTIS HC A03/MF A01 CSCL 22B

Longitudinal and lateral-directional characteristics of a simple biwing configuration were determined over an angle-of-attack range

from -3 deg to 50 deg. The body was comprised of a cylindrical section with an ogival forebody having an overall fineness ratio of 6.67. The delta wings had a 38.3 deg sweep angle and were geometrically similar in planform. The upper wing was located slightly forward relative to the lower wing. The model was tested in upright and inverted orientations including component buildups. This investigation was conducted in the 22-inch aerodynamics leg of the Langley Hypersonic Helium Tunnel Facility. Author

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N85-17022# Tri-Con Associates, Inc., Cambridge, Mass.
THE DESIGN OF AN ION-NEUTRAL MASS SPECTROMETER TO BE USED IN THE SHUTTLE ENVIRONMENT Final Report, Mar. 1983 - May 1984
C. J. Risicato 30 Aug. 1984 62 p
(Contract F19628-83-C-0085)
(AD-A148093; C-211; AFGL-TR-84-0228) Avail: NTIS HC A04/MF A01 CSCL 22/1

This report discussed the development of instrumentation to be flown on the space shuttle. The instrument is a quadrapole mass spectrometer designed to measure preselected masses in the 1 AMU to 70 AMU region. A discussion of the various circuits will be included in this report along with a full set of schematics, drawings, wiring lists and sample control programs. GRA

N85-16955*# LinCom Corp., Los Angeles, Calif.
THE STATISTICAL LOOP ANALYZER (SLA)
William C. Lindsey *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 810-814 (For primary document see N85-16937 08-12)
(Contract NAS9-16691)
Avail: NTIS HC A23/MF A01 CSCL 01D

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N85-17023*# TRW Space Technology Labs., Redondo Beach, Calif. Energy Technology Div.
HIGH FREQUENCY PLASMA GENERATOR FOR ION THRUSTERS Final Report, Sep. 1980 - Apr. 1983
Heinz Goede, William F. DiVergilio, Verryl V. Fosnight, and G. Komatsu Jul. 1984 74 p refs
(Contract NAS3-22473)
(NASA-CR-174772; NAS 1.26:174772) Avail: NTIS HC A04/MF A01 CSCL 21C

The results of a program to experimentally develop two new types of plasma generators for 30 cm electrostatic argon ion thrusters are presented. The two plasma generating methods selected for this study were by radio frequency induction (RFI), operating at an input power frequency of 1 MHz, and by electron cyclotron heating (ECH) at an operating frequency of 5.0 GHz. Both of these generators utilize multiline cusp permanent magnet configurations for plasma confinement and beam profile optimization. The program goals were to develop a plasma generator possessing the characteristics of high electrical efficiency (low eV/ion) and simplicity of operation while maintaining the reliability and durability of the conventional hollow cathode plasma sources. The RFI plasma generator has achieved minimum discharge losses of 120 eV/ion while the ECH generator has obtained 145 eV/ion, assuming a 90% ion optical transparency of the electrostatic acceleration system. Details of experimental tests with a variety of magnet configurations are presented. Author

N85-17024# Georgia Inst. of Tech., Atlanta. School of Aerospace Medicine.
COMBUSTION DYNAMICS IN ROCKETS Annual Report, 1 Oct. 1983 - 30 Sep. 1984
J. I. Jagoda, E. W. Price, R. K. Sigman, W. C. Strahle, and R. E. Walterick 30 Sep. 1984 37 p
(Grant AF-AFOSR-0356-83)
(AD-A148478; AFOSR-84-1074TR) Avail: NTIS HC A03/MF A01 CSCL 21/2

Progress is reported on two distinct projects which are administered as a group. A summary for each task follows: Task 1: Laser velocimetry has mapped two velocity component data for the backward facing step facility with and without blowing of air and CO2 from the bottom wall of the facility. Comparison of experiment with theory, using a k-epsilon tubulence model, has shown good agreement between the two. Diagnostic development has continued with the Rayleigh scattering system now operational and the Raman spectroscopy system still under development. Software development for simultaneous Rayleigh concentration and laser velocimeter measurements was completed. Dominant results are the general predictability of the length scales of the flow field and the appearance of a second recirculation zone under the action of sidewall blowing. Studies continued on the behavior of aluminum and other nonvolatile ingredients in the propellant combustion zone are presented. GRA

N85-17025# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
HAZARD STUDIES FOR SOLID PROPELLANT ROCKET MOTORS
Loughton, England Sep. 1984 297 p refs In ENGLISH and FRENCH Conf. held in Lisse, Netherlands, 28-30 May 1984
(AGARD-CP-367; ISBN-92-835-0361-9) Avail: NTIS HC A13/MF A01

The needs for NATO standardization as related to solid propellant rocket motors are reviewed and technology issues associated with solid rocket motor hazards are discussed. The following topics associated with solid propellant rocket motors are considered: (1) application of hazard technologies; (2) fragmentation and high rate deformation of solid propellants; (3) mechanism, theory, and experiments; and (4) thermal sensitivity and cook-off. For individual titles, see N85-17026 through N85-17046.

N85-17026# Royal Marines, London (England).
AIMS AND REQUIREMENTS OF NATO GROUP AC/310
G. G. W. Brace *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 11 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

One aim of NATO is to achieve increased military effectiveness through the efficient use of resources allocated by nations for their defence. This involves cross procurement between nations and in the case of weapons and stores containing explosives, there can be economy of resources if there is a common approach within NATO to the safety of designs and the test requirements necessary to demonstrate safety. Such demonstrations must commence with the assessment of the energetic materials chosen for use. Commonality of test procedures is not envisaged, but a base line requirement for the data to enable safety assessments by purchasing nations has been agreed. It is recognized that, for propellant formulations in particular, problems exist because of the need to adjust compositions during development. A method to accommodate such problems when meeting the NATO data requirements is proposed. A base line requirement is created for the data considered necessary for the assessment of explosive compositions for their safety and suitability for service use. Such data should enable any nation receiving explosives to make a judgement, and thereby qualify the material. R.S.F.

N85-17027# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
REVIEW OF USAF TREATMENT OF SOLID PROPELLANT ROCKET MOTOR HAZARDS
Richard R. Weiss, Norman VanderHyde, and Claude Merrill *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 15 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

Efforts pursued under the air-launched missile behavior program are summarized. The impact effects on solid rocket propellants are discussed along with the explosive hazards of air-launched propulsion systems. Various tests to assess propellant stability are enumerated. The results of experimental investigations to standardize shotgun/relative quickness bomb testing and to improve the sensitivity of the dynamic shear/deflagration-to-detonation transition test are reported. R.S.F.

N85-17028# Bundesinstitut fuer Chemisch-Technische Untersuchgen, Swisttal-Heimerzheim (West Germany).
SENSITIVITY TESTS FOR SOLID PROPELLANTS IN GERMANY **c28**
F. Trimborn *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 5 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

Sensitivity tests are very important for the investigation and acceptance of solid propellants according to the regulations for the safety of explosives in Germany. The background for this is provided by a philosophy of safety involving the concept of primary safety. To achieve primary safety, it is necessary to know and to consider the explosive properties of the solid propellants. German methods for testing the sensitivity to impact, friction, shockwaves, heating and DDT are discussed. From the results trained experts can draw conclusions for the safety of solid propellants and/or for the risk emanating from them. Comparisons with accidents/incidents show that the results of the German test methods within the context of the expert's own experience can be used to characterize at least the different types of solid propellants. A.R.H.

N85-17029# Propellants, Explosives and Rocket Motor Establishment, Waltham Abbey (England).
SENSITIVENESS AND EXPLOSIVENESS ASSESSMENT AT PERME WALTHAM ABBEY **c28**
D. C. Mullenger *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 8 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

The schemes used at PERME for testing propellants, for the production of MOD Safety Certificates, for the assignment of the UN Hazard Division, and for the Ordnance Board Qualification for Service use are presented. The types of test used these schemes are described. Typical results for a range of rocket propellant compositions are given and discussed. Author

N85-17030# Illinois Univ., Urbana-Champaign. Dept. of Mechanical and Industrial Engineering.
ANALYSIS OF DEFLAGRATION TO SHOCK TO DETONATION TRANSITION (DSDT) IN POROUS ENERGETIC SOLID PROPELLANTS **c28**
P. Barry Butler and Herman Krier *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 10 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

Explosive-based propellants are susceptible to detonation from the controlled deflagration mode of combustion. In certain instances (i.e., when the propellant/explosive is fragmented) the likelihood of a catastrophic event is greater. Fragment size, gas permeability through the packed bed, chemical decomposition rate and product gas confinement all play an important role in determining whether a convective deflagration wave will make a transition to a steady state detonation wave. The governing equations defining such a transient two-phase reactive flow process are analyzed. Computer generated results are presented showing the development of a steady state detonation wave from an accelerating deflagration wave. M.G.

N85-17031# Norwegian Defence Research Establishment, Kjeller.
PENGUIN WARHEAD SAFETY TESTS **c28**
E. Stromsoe, A. Oddan, and L. Omholt *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 9 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

Safety tests according to the Naval Weapons Requirement WR-50 were carried out with Destex filled Penguin warheads. To simulate fuel fire and magazine heating the fast and slow cook-off tests were chosen; for projectiles the bullet impact test; and for fragments the propagation test where another warhead is used as fragment generator (donor). Six categories of warhead response were used to characterize the severeness of explosive reaction: high order detonation, violent low order detonation, non-violent low order detonation, deflagration, burning, no reaction. The main lesson which can be learned from these experiments is that even if the prescribed test procedure is faithfully followed, great scattering of the test results can be expected. Decisive conclusions should therefore not be drawn from two few experiments. Other valuable experience connected with each separate test is presented. Author

N85-17032# Centre de Recherches du Bouchet, Vert de Petit (France).
STUDY OF THE TRANSITION FROM DEFLAGRATION TO DETONATION OF PREVIOUSLY FRAGMENTED PROPELLANTS [ETUDE DE LA TRANSITION DE LA DEFLAGRATION A LA DETONATION DES PROPERGOLS PREALABLEMENT FRAGMENTES] **c25**
J. Brunet and J. L. Paulin *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 22 p refs In FRENCH (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

The problem of the possibility of transition from deflagration to detonation in a body from the time of firing an engine with a charge of solid propellants is approached by considering a local fragmentation stage. A method of characterizing the resistance of solid propellants to hazardous fragmentation is described which uses specific tests: impact against a smooth wall, combustion of fragments in a manometrical bomb, and a transition test. This resistance is manifested by an impact velocity limit. Numerous velocity impact limits were measured on several compositions and parametric studies of formulations yielded orientations or obtaining a better behavior of propellant materials in the future with regards to the risks of hazardous fragmentation. Transl. by A.R.H.

N85-17033# Imperial Metal Industries Ltd., Kidderminster (England).
THE VULNERABILITY OF CAST DOUBLE BASE ROCKET MOTORS TO THERMOMECHANICAL ATTACK
G. I. Evans, J. F. Bingham, and J. H. Sindall *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 14 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

Fragment penetration and fire trials were conducted on a dual thrust motor employing a cast double base propellant. The propellant in the motor is bonded to the case wall and thus the type of damage that can occur to a cartridge loaded charge is prevented. When the motor is attacked by single fragments an area, depending on size and weight of the fragment, of strip delamination in the case is created about the fragment exit point. On ignition of the propellant, hot gas flowing from this area steadily increases the delamination and prevents pressure build up to explosive levels. The reaction to multi-fragment attack is similar to that of a single fragment except when the attacking projectile explodes in close proximity to the motor. Under these conditions the case construction allows the motor to snap into a number of pieces and again prevents motor explosion. When subjected to heat, the resin used for strip bonding begins to break down. At the instant of propellant ignition only very low pressures are required

to disrupt the motor case and thus provide a multitude of paths for gas to exhaust to prevent explosive pressure build up. M.G.

N85-17034# Propellants, Explosives and Rocket Motor Establishment, Waltham Abbey (England).
CRACK GROWTH IN PROPELLANTS c28
R. A. Gledhill and A. J. Kinloch *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 7 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

A continuum fracture mechanics approach for characterizing crack growth in a nitrocellulose/nitroglycerine based propellant is presented. Firstly, the measurement of the stress-intensity factor, K sub c, at the onset of crack propagation over a wide range of test temperatures and under relatively slow rates of loading is discussed. The use of the Williams-Landel-Ferry equation for relating the effects of rate and temperature is then examined. Secondly, crack growth resulting from impact loading is examined. The instrumented impact test equipment is described and the experimentally obtained values of K sub c are discussed. R.J.F.

N85-17035# California Univ., Livermore. Lawrence Livermore Lab.
RESPONSE OF PROPELLANTS TO HIGH DYNAMIC STRESSES: THE USES OF GUN LAUNCH TECHNIQUES c28
E. L. Lee, E. James, L. Green, W. VonHolle, C. Tarver, D. Curran (Stanford Research Intern., Menlo Park, Calif.), W. Murri (Stanford Research Intern., Menlo Park, Calif.), and D. Seaman (Stanford Research Intern., Menlo Park, Calif.) *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 32 p refs Previously announced as N85-11259 (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

High energy propellants that ignite and begin to release chemical energy when they are subjected to sufficiently high stresses are discussed. The ensuing response can vary from mild reaction to high order detonation. Experimental and calculation efforts were made to understand, predict, and modify this response. Experimental work which uses guns to impact flat plates on oriented propellant samples is emphasized. R.J.F.

N85-17036# Ballistic Research Labs., Aberdeen Proving Ground, Md.
SOME ASPECTS OF THE MICROMECHANICS OF HOT SPOT FORMATION IN ENERGETIC MATERIALS c28
Robert B. Frey *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 14 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

The mechanics of cavity collapse in an energetic material were studied. During cavity collapse, several mechanisms can act individually or collectively to produce high temperature hot spots. The goal is to understand how pressurization rate, cavity size, and material parameters affect hot spot formation. The collapse of spherical cavities using a modified form of the model of Carroll and Holt was considered. Using this analysis, hot spots produced by plastic work, viscoplastic work, gas phase heating, or solid phase compression (which occurs as the result of high pressures produced when material collides at the center of the cavity) can be studied. Under the proper conditions, each of these mechanisms may be dominant, but viscous heating is the most efficient mechanism and is dominant when the rise time of the pressure is short, viscosity is high, and/or yield stress is low. The conditions under which the other mechanisms are dominant and the dependence of hot spot temperatures on the pressurization rate, cavity size, and material properties are discussed. R.J.F.

N85-17037# Naval Weapons Center, China Lake, Calif. Engineering Sciences Div.
TRANSIENT COMBUSTION: AN IMPORTANT CONSIDERATION IN DEFLAGRATION-TO-DETONATION TRANSITION c25
T. L. Boggs, C. F. Price, and R. L. Derr *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 16 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

Transient combustion events which range from igniter initiation to events just prior to detonation, are discussed. An analytical model of the deflagration of porous energetic materials leading to deflagration to detonation transition (DDT) in closed tube experiments is presented. The analysis not only describes transient deflagration behavior but also includes the highly coupled interaction of the deflagration with the sample and its environment compaction behavior for example. The model calculates the following as functions of distance and time from igniter initiation: (1) gas pressure; (2) intergranular stress; (3) gas temperature; (4) surface temperatures of the particle; (5) compaction; (6) development of gas phase reaction over the particles; (7) amount of solid pyrolyzed; and (8) amount of pyrolysis gas converted to final products. It is concluded that the combustion behavior essential to understanding DDT is entirely transient and must be treated in its full complexity of interrelated and highly coupled phenomena. E.A.K.

N85-17038# Naval Surface Weapons Center, White Oak, Md.
THE DDT PROCESS FOR HIGH ENERGY PROPELLANTS c28
Richard R. Bernecker *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 16 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

The deflagration-to-detonation transition (DDT) process is reviewed for cast and porous systems of energetic propellants. Analysis of DDT studies with cast explosive systems indicate that it is highly improbable that cast, well-manufactured propellant grains will undergo DDT. The DDT experiments are described which relate the nature of the damaged (granulated) propellant samples to their tendency to undergo DDT. The parameters, which influence the outcome of these DDT experiments are discussed. One of the more practical pieces of information pertaining to hazards that can be obtained in DDT work is a quantitative measure of the propensity of various porous propellant systems to undergo DDT. This type of data is presented for various energetic propellants for both high and low confinement conditions. An example of this type of experiment, where dynamic shearing occurs during confined burning is discussed. Data are presented from low confinement DDT experiments, utilizing flash radiography, which provided quantitative data useful for the development of physical and theoretical/numerical models of the DDT process. It is shown that knowledge of the shock sensitivity of the porous propellant system is important in assessing its DDT susceptibility under low confinement conditions. E.A.K.

N85-17039# Centre de Recherches du Bouchet, Vert de Petit (France).
NUMERICAL SIMULATION OF THE SHOCK DETONATION TRANSITION [SIMULATION NUMERIQUE DE LA TRANSITION CHOC DETONATION] c25
B. Nouguez, A. Bertrand, and J. Mala *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 10 p refs In FRENCH (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

A study was conducted at S.N.P.E. which attempts to model numerically the shock-detonation transition of explosive materials. A model of combustion was developed and implanted in the HEMP bidimensional computer code. General hypothesis about the model, the principal equations retained to describe the phenomena, and the first application of the model to validate the code on PETN - TATB type products and HMX are presented. Transl. by A.R.H.

N85-17040# Los Alamos Scientific Lab., N. Mex.
SHOCK AND IMPACT RESPONSE OF SOLID ROCKET PROPELLANTS: EXPERIMENTAL AND THEORETICAL c28
John K. Dienes and Jerry J. Dick *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 16 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

Data on plane-shock-initiation sensitivity of a number of

propellant formulations are reviewed and shock sensitivity results for 35% porous HMX are presented. These data were obtained using transit time technique and statistical analysis. Though the sensitivity of propellants is of central importance in considering their reliability and safety, and underlying mechanisms are not very well understood. These problems are underscored by cylinder impact tests that demonstrate a wide variety of behavior. In particular, most shots in one series of low speed impact tests led to a mild deflagration, while a fraction of ostensibly identical shots resulted in violet detonations. Since continuum descriptions of such behavior fail to explain the lack of repeatability, a variety of hot-spot mechanisms were considered. Order-of-magnitude studies indicate that interfacial sliding of closed cracks constitutes the most critical type of hot spot, and detailed analysis confirms that this mechanisms explains the observations. B.G.

N85-17041# Bundesinstitut fuer Chemisch-Technische Untersuchgen, Swisttal-Heimerzheim (West Germany).
BALLISTIC/DETONIC TRANSITION OF PROPELLANTS c28
C. O. Leiber *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 14 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

Occasional catastrophic failures of propellant systems, such as those resulting in breech blows or rocket explosions, may be caused basically by an anomalous increase of the static or dynamic pressure in the gas phase and/or in the condensed phase. Using the classical principles of pressure wave generation by a hydrodynamic flow of Lord Rayleigh and Lighthill, it is demonstrated that interior ballistics splits both into a classical and also a detonic branch, the latter correponding to the Low-Velocity-Detonation (LVD)-regime. According to the physical model, this transition is favored by increased dynamics. The region between these limits corresponds to the Gallwitz regime. B.G.

N85-17042# Propellants, Explosives and Rocket Motor Establishment, Waltham Abbey (England).
HAZARD ASSESSMENT OF A HYPOTHETICAL LARGE ROCKET MOTOR
D. C. Mullenger *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 5 p (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

The relationship between sensitiveness, explosiveness and hazard is discussed. Stimuli relevant to this particular problem are listed and their relative importance is discussed. The difficulty of scaling up from test samples to the full motor is considered and the present philosophy for tackling this problem is given. Author

N85-17043# Prins Maurits Lab. TNO, Rijswijk (Netherlands).
THE HEAT SENSITIVITY OF SOLID PROPELLANTS c28
M. A. Schrader, M. W. Leeuw, and A. C. vanderSteen *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 6 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

The temperature dependence of the induction times of composite propellants are measured and compared to those of pure ammonium perchlorate. The induction times of the composite propellants appear to be considerably shorter: at 600 K the differences is about a factor of fifty. The addition of aluminum, nitroguanidine or a burning catalyst to ammonium perchlorate does not influence its induction time. The increased rate of decomposition is attributed to the polyurethane binder whose decomposition products possibly catalyze the decomposition reaction of ammonium perchlorate. The plasticizer in a double base propellant does not affect the induction times. Author

N85-17044# Centre de Recherches du Bouchet, Vert de Petit (France).
MODELLING THE THERMAL EXPLOSION PHENOMENON IN SOLID PROPELLANTS: THE CASE OF FIXED AND VARIABLE TEMPERATURES [MODELISATION DU PHENOMENE D'EXPLOSION THERMIQUE DANS LES PROPERGOLS SOLIDES: CAS DES TEMPERATURES FIXES ET VARIABLES] c28
D. Casenave and P. Racimor *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 14 p refs In FRENCH (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

The state of the art of work at S.N.P.E on thermal explosion phenomena as part of the study of solid propellant stability is presented. In the case of a product subjected to successive increases in temperature, the base theory of the phenomena led to a test method which established for each composition tested, a model for evaluating the critical temperature and the induction time of the product as a function of the size and the configuration of the bulk propellant. The thermal explosion phenomena is also shown for the case of a product subjected to a progressive increase in temperature. A computer code was also developed which can model the thermal explosion phenomenon. Theoretical results are in good agreement with experiment and confirm, in the case of variable temperature, that a decrease in the speed of temperature rise favors the appearance of violet phenomena. Transl. by A.R.H.

N85-17045# Institut fuer Chemie der Treib- und Explosivstoffe, Pfinztal (West Germany).
DETERMINATION OF THE DECOMPOSITION BEHAVIOR OF DOUBLE BASE PROPELLANTS AT LOW TEMPERATURES c28
F. Volk *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 7 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

Aging in double-base solid propellants was explored using chemical, physico-chemical, and mechanical methods. High-pressure liquid chromatography was used to calculate the chemical life by determining the decrease in stabilizer to 50% of its original content. Gel permeation chromatography was used to track the depolymerization of the nitrocellulose contained in the relevant propellant by measuring the reduction in molecular weight. Measurement of the strain at break and the tensile strength of the product determine the deterioration of its mechanical properties. Suitable samples of propellant were subjected to thermic stress between 60 C and 90 C for different lengths of time to establish the actual temperature dependency of the three aging processes considered. The best temperature correlation was shown through measurement of the stabilizer decrease; however, both the reduction in the molecular weight of the nitrocellulose and the drop in mechanical properties could not be determined with the same accuracy. The results show that a depolymerization of the nitrocellulose takes place more rapidly than the drop in tensile strength. B.W.

N85-17046# Politecnico di Milano (Italy).
THE PRESSURE DEFLAGRATION LIMIT OF SOLID ROCKET PROPELLANTS c28
L. DeLuca, G. Riva, C. Zanotti, R. Donde, V. Lapegna, and A. Oleari *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 16 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

The concept of pressure deflagration limit in the combustion of solid rocket propellants is reviewed. It is shown that the existence of a pressure deflagration limit is due not to lack of the appropriate steady state solution, but to burning instability (even for adiabatic combustion). The peculiar behavior of solid propellants near the pressure deflagration limit is confirmed by numerical and experimental tests of ammonium perchlorate based composite formulations. Self-sustained oscillatory burning, existing immediately before reaching the pressure deflagration limit, was investigated. Attention was focused on those physico-chemical properties and operating conditions capable to raise the value of the pressure deflagration limit. This should allow safer handling and storage of solid propellants. Author

N85-16895*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SPACE SHUTTLE MAIN ENGINE HARDWARE SIMULATION
H. G. Vick and P. W. Hampton *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 54-63 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 21H

N85-16940*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE MAIN ENGINE: INTERACTIVE DESIGN CHALLENGES
John P. McCarty and Byron K. Wood (Rockwell International Corp.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 600-617 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 22H

N85-16941*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SOLID ROCKET MOTOR CERTIFICATION TO MEET SPACE SHUTTLE REQUIREMENTS FROM CHALLENGE TO ACHIEVEMENT
John Q. Miller and Joe C. Kilminster (Thiokol, Inc., Brigham City, Utah) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 618-627 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 21H

N85-16942*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DEBRIS CONTROL DESIGN ACHIEVEMENTS OF THE BOOSTER SEPARATION MOTORS
Gerald W. Smith and Charles A. Chase (United Technologies Corp., Sunnyvale, Calif.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 628-638 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 21H

N85-16976*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THERMAL DESIGN OF THE SPACE SHUTTLE SOLID ROCKET BOOSTER
Robert R. Fisher, Jerold L. Vaniman, and William J. Patterson *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1030-1040 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 20H

N85-16999*# Aerojet Technical Systems Co., Sacramento, Calif.
AEROJET ADVANCED ENGINE CONCEPT
L. Schoenman *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 113-125 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 20H

N85-17000*# Pratt and Whitney Aircraft, East Hartford, Conn.
ADVANCED OTV ENGINES AND ISSUES
J. R. Brown *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 127-134 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 20H

N85-17001*# Rocketdyne, Canoga Park, Calif.
ADVANCED OTV ENGINE CONCEPTS
A. T. Zachary *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 135-148 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 22B

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

No abstracts in this category.

24 COMPOSITE MATERIALS

Includes laminates.

N85-17047*# North Carolina State Univ., Raleigh. Dept. of Physics.
EFFECTS OF HIGH ENERGY RADIATION ON THE MECHANICAL PROPERTIES OF EPOXY-GRAPHITE FIBER REINFORCED COMPOSITES Research Report, 1 Jan. - 31 Dec. 1984
R. E. Fornes, R. D. Gilbert, and J. D. Memory 31 Dec. 1984 58 p
(Grant NsG-1562)
(NASA-CR-174314; NAS 1.26:174314) Avail: NTIS HC A04/MF A01 CSCL 11D

The effects of high energy radiation on the mechanical properties and on the molecular and structural properties of graphite fiber reinforced composites were assessed so that the durability of such composites in space applications could be predicted. Investigative techniques including ESR and infrared spectroscopy, ESCA, contact angle measurements, and dynamic and static mechanical testing (3-point bending and interlaminar shear) were employed. The results using these different techniques are individually described, and the implications of the data are discussed. The proposed plan of work for the next fiscal year is outlined. R.S.F.

N85-17048*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ADVANCES IN COMPOSITES TECHNOLOGY
Darrel R. Tenney and H. Benson Dexter Jan. 1985 33 p refs
(NASA-TM-86353; NAS 1.15:86353) Avail: NTIS HC A03/MF A01 CSCL 11D

A significant level of research is currently focused on the development of tough resins and high strain fibers in an effort to gain improved damage tolerance. Moderate success has been achieved with the development of new resins such as PEEK and additional improvements look promising with new thermoplastic resins. Development of innovative material forms such as 2-D and 3-D woven fabrics and braided structural subelements is also expected to improve damage tolerance and durability of composite hardware. The new thrust in composites is to develop low cost manufacturing and design concepts to lower the cost of composite hardware. Processes being examined include automated material placement, filament winding, pultrusion, and thermoforming. The factory of the future will likely incorporate extensive automation in all aspects of manufacturing composite components. B.W.

N85-17049*# Lockheed-California Co., Burbank.
FLIGHT SERVICE EVALUATION OF ADVANCED COMPOSITE AILERONS ON THE L-1011 TRANSPORT AIRCRAFT Annual Flight Service Report
R. H. Stone Dec. 1984 10 p refs
(Contract NAS1-15069)
(NASA-CR-172483; NAS 1.26:172483; LR-30774; AFSR-2) Avail: NTIS HC A02/MF A01 CSCL 11D

A flight service evaluation of composite inboard ailerons on the L-1011 is discussed. This is the second annual report of the maintenance evaluation program, and covers the period from July 1983 when the first yearly inspections were completed, through July 1984. Four shipsets of graphite/epoxy composite ailerons were installed on L-1011 aircraft for this maintenance evaluation program. These include two Delta aircraft and two TWA aircraft.

A fifth shipset of composite ailerons were installed in 1980 on Lockheed's flight test L-1011. A visual inspection was also conducted on these components. No visible damage was observed on any of the composite ailerons, and no maintenance action has occurred on any of the composite parts except for repainting of areas with paint loss. Flight hours on the airline components at the time of inspection ranged from 6318 to 6989 hours, after approximately 2 years of service. B.W.

N85-17050# Army Natick Research and Development Command, Mass. Science and Advanced Technology Lab.

DENITRIFICATION-EFFICIENCIES OF ALTERNATE CARBON SOURCES Final Report

David L. Kaplan, Patricia A. Riley, Jennifer Pierce, and Arthur M. Kaplan Jul. 1984 35 p

(AD-A148029; NATICK/TR-85/003) Avail: NTIS HC A03/MF A01 CSCL 07/3

Eleven industrial carbon sources were evaluated for their efficiency to supply energy for biological denitrification of high nitrates (1259 mg/liter) in a single-stage continuous flow fermenter. The determination of relative efficiency was the minimum C/N ratio (grams of carbon to grams of nitrogen) necessary to achieve at least 95% denitrification and 90% total organic carbon (TOC) removal. Methanol was the most efficient carbon source evaluated, while sweet whey, corn steep liquor, acid whey and soluble potato solids followed in order of decreasing efficiency. Three of the carbon sources failed to achieve the 90% reduction in TOC. Sewage sludge was unusable due to lack of available carbon. This order of efficiency may change once other factors are considered such as cost of carbon source, transportation costs, handling costs, availability, and other factors. In the treatment of nitrate contaminated munitions process waters the use of alternate carbon sources will be needed not only for biological nitrate reduction but also for the biological cometabolism of many of the munition compounds themselves. GRA

N85-17051# Massachusetts Univ., Amherst. Dept. of Polymer Science and Engineering.

MODEL FOR PREDICTION OF THE ELASTIC RESPONSE OF COMPOSITE MATERIALS OVER WIDE RANGES OF CONCENTRATION

J. C. W. Chien 26 Oct. 1984 28 p

(Contract N00014-83-K-0083)

(AD-A148186; TR-8) Avail: NTIS HC A03/MF A01 CSCL 11/4

A model for the prediction of the elastic response of composite materials over wide ranges of concentration is presented. The method is based on the mathematical analogy between the motion of particles suspended in viscous media and the elastic deformation of solids. The system is locally described by linearized forms of the elastic moduli. The validity of these relations is then extended to all concentrations under the assumption that any new portion of filler sees the existing composite as a non-interacting homogeneous matrix. The method predicts the behavior of composites with solid spherical inclusions and foams over wide ranges of concentration. The model, free from adjustable parameters, shows excellent agreement with existing experimental data. The extension of the method to other inclusion geometries is straightforward. GRA

N85-17052# Acurex Corp., Mountain View, Calif.

DISCLINATIONS IN CARBON-CARBON COMPOSITES Annual Report, Jul. 1983 - Jul. 1984

J. E. Zimmer and R. L. Weitz Sep. 1984 80 p

(Contract N00014-81-C-0641)

(AD-A148290; TR-84-17/ATD; AR-3) Avail: NTIS HC A05/MF A01 CSCL 11/4

The carbonaceous mesophase is the discotic nematic liquid formed during the pyrolysis of the petroleum and coal-tar pitch precursors for the matrix of carbon-carbon composites. The disklike, aromatic molecules of the mesophase are diamagnetic and can be oriented by a magnetic field. This research has involved the study of the effect of a magnetic field on the alignment of the carbonaceous mesophase by itself as matrix between fiber bundles, within fiber bundles, and within a bidirectional fiber composite. The pyrolysis of a bidirectional fiber composite in the presence of the magnetic field has shown that the matrix between the fiber bundles can be oriented perpendicular to the graphite-fiber fabric plies when the magnetic field direction is perpendicular to the fabric plies. This oriented matrix should provide improved resistance to interlaminar shear fracture. GRA

N85-17053# Maryland Univ., College Park. Lab. for Numerical Analysis.

COMPOSITES WITH A PERIODIC STRUCTURE, MATHEMATICAL ANALYSIS AND NUMERICAL TREATMENT Final Report

I. Babuska and R. C. Morgan Oct. 1984 27 p

(Contract N00014-77-C-0623)

(AD-A148301; BN-1030) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper introduces a systematic approach for the derivation of models that describe the behavior of composites with a periodic structure. A technique for analyzing the accuracy of the model is addressed. Although the theory has been developed for the general, n-dimensional setting, the main ideas in this paper are presented for the 1-dimensional case only, for reasons of simplicity. The effectivity of the approach is illustrated with numerical examples. Also, the approach has the potential of being used to adaptively select the best homogenization model. Author (GRA)

N85-17054# Westinghouse Research and Development Center, Pittsburgh, Pa.

MONITORING CURE OF EPOXY RESINS USING A MICRODIELECTROMETER Technical Report, Feb. 1982 - Jan. 1984

Z. N. Sanjana and R. L. Selby Sep. 1984 22 p

(Contract N00014-82-C-0164)

(AD-A148618; Rept-9B71-CURES-R1; TR-1) Avail: NTIS HC A02/MF A01 CSCL 13/8

Microdielectrometry is a recent advancement in monitoring the cure of resins using dielectric techniques. It utilizes a solid state chip roughly .075 in. x .075 in. as the probe, and has on-chip amplification of the signal which permits interrogation of the material at frequencies as low as 1 Hz. This paper discusses cure monitoring of resins utilizing microdielectrometry and compares the technique and instrumentation to conventional dielectrometry. Data on an anhydride cured system and an aromatic amine cured system cured under isothermal and temperature variant conditions are presented. Results show that microdielectrometry can be used to follow cure of epoxy resins. Absolute measurements of permittivity and loss factor can be made and they provide information on the mechanisms that produce the observed changes. The present packaging of the chip is unsuitable for use with composites. GRA

N85-17055# Westinghouse Research and Development Center, Pittsburgh, Pa.

THE USE OF MICRODIELECTROMETRY IN MONITORING THE CURE OF RESINS AND COMPOSITES Technical Report, Jan. - Jul. 1984

Z. N. Sanjana Sep. 1984 23 p

(Contract N00014-82-C-0164)

(AD-A148619; Rept-9B71-CURES-R2; TR-2) Avail: NTIS HC A02/MF A01 CSCL 13/8

As thermosetting resins and composites made from them begin to be used in critical applications, it becomes necessary to monitor and analyze the cure of the resin within the confines of the processing equipment. Such measurements have been carried out using a dielectric technique called dielectrometry or dielectric analysis. Conventional dielectrometry has certain limitations associated with the use of parallel plate geometry for electrodes. For in situ measurement of cure, intrusiveness, of electrodes is a problem which may require placement of electrodes in non-strategic areas. Since electrode spacing changes during cure, it is difficult to deduce permittivity and loss factor from the data. One approach to overcome the problems described above is the development of microdielectrometry. The electrode geometry does not change, therefore loss factor and permittivity data can be deduced in

real-time. Results on an aromatic amine cured epoxy resin and a dicyandiamide cured epoxy resin prepreg are presented in this report. GRA

N85-17056# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
MODELING LOCALIZED STRESS FIELDS IN COMPOSITE LAMINATES Final Scientific Report, 15 Jun. 1983 - 31 Mar. 1984
E. R. Johnson Jul. 1984 10 p
(Grant AF-AFOSR-0191-83)
(AD-A148630; AFOSR-84-1116TR) Avail: NTIS HC A02/MF A01 CSCL 11/4

A structural model is developed using Reissner's variational principle to analyze stress gradient problems in laminated composite plates. A statically admissible stress field, which has explicit dependence on the thickness coordinate, is selected for each layer. Both interlaminar traction and displacement continuity are enforced between layers. This model is similar to an earlier one developed by Pagano, but has four dependent variables less per layer than Pagano's model. It is shown that the model can duplicate Pagano's results for the same number of subdivisions through the thickness. The uniform axial extension of a bidirectional symmetric laminate is used as the example problem for comparison to Pagano's theory and to illustrate the methodology. GRA

N85-17057# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
COMPOSITE STRUCTURE REPAIR, ADDENDUM
Loughton, England Aug. 1984 26 p refs Presented at the 58th Meeting of the Struct. and Mater. Panel, Sienna, Italy, 2-6 Apr. 1984 Addendum to AGARD-R-716; N84-31300
(AGARD-R-716-Add; ISBN-92-835-1476-9) Avail: NTIS HC A03/MF A01

Programs are presented in which bonded and bolted composite repair techniques were validated. The repair of specific military and commercial aircraft components is addressed. Composite repair of flat laminates, integral stiffened panels, and honeycomb sandwich structures on aircraft is discussed. For individual titles, see N85-17058 through N85-17059.

N85-17058# Naval Air Development Center, Warminster, Pa.
REPAIR OF COMPOSITES
T. M. Donnellan, E. L. Rosenzweig, R. E. Trabocco, and J. G. Williams (Aeronautical Research Labs., Melbourne) *In* AGARD Composite Struct. Repair, Addendum Aug. 1984 10 p refs (For primary document see N85-17057 08-24)
Avail: NTIS HC A03/MF A01

Developments in composite repair technology are discussed. The planned use of composites in primary aircraft structure has necessitated the development of a specialized repair technology. The types of damage seen in composites differs from conventional materials. Delamination is the most serious composite defect since it can exist without causing surface damage. The two techniques used to repair composites are bonded and bolted approaches. A number of programs have been performed which have evaluated repair techniques under simulated operating conditions. Programs are discussed in which bonded and bolted repair techniques were validated. Generic repair development programs are described in which the repairs were performed with equipment and techniques possible in the service environment. The results of these studies show that the repairs restored the component structural integrity. Repair programs on specific military and commercial aircraft are also described. The components studied included an AHI rotor blade, a S-3A spoiler and a L-1011 fin. R.S.F.

N85-17059# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
COMPOSITE REPAIR OF AIRCRAFT STRUCTURES
Josef W. Vilsmeier *In* AGARD Composite Struct. Repair, Addendum Aug. 1984 9 p (For primary document see N85-17057 08-24)
Avail: NTIS HC A03/MF A01

The repair of composite and metallic aircraft structures with composite materials has become a matter of world wide interest and activity. Activities in the field of composite repair of flat laminates, honeycomb sandwich structures, and integral stiffened panels are presented. Composite repair problems, aircraft battle damage repair, bonding on wet laminates, environmental effects, and problems associated with nondestructive testing of repaired structures and repair of joints are discussed. R.S.F.

N85-17185# Joint Publications Research Service, Arlington, Va.
HIGH PRESSURE PHYSICS RESEARCH FOCUSING ON COMPOSITE MATERIALS
Heinz Stiller *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) 28 Dec. 1984 p 4-5 Transl. into ENGLISH from Spectrum (East Berlin), v. 15, no. 9, 1984 p 10-11 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N85-17060 Cornell Univ., Ithaca, N.Y.
RAYLEIGH AND RAMAN SCATTERING FOR DENSITY IN A SWIRLING FLOW COMBUSTOR Ph.D. Thesis
Rangasayi Narayan Halthore 1984 269 p
Avail: Univ. Microfilms Order No. DA8415323

Laser scattering measurements of density are conducted in a swirling flow combustor. The combustor uses two swirling concentric jets with the inner jet of air premixed with methane and outer jet comprising only air. A free standing recirculation zone is formed on the axis at the inlet of the combustor due to the vortex breakdown mechanism. Rayleigh is used for time resolved total density measurements and Raman scattering is used for time averaged methane density measurements. A laser beam multipassing technique is employed to enhance the effective beam power to make Raman scattering measurements possible. Spatial resolution which is unaffected by multipassing is in the form of a cylinder 1mm in length and 0.1mm in diameter. Results are reported for co-swirling and counter-swirling flow configurations of the swirling jets and are obtained at six axial locations and many radial locations at the inlet region of the combustor. Repeatability of these results is better than 4% for Rayleigh scattering and 6% for Raman scattering measurements. Dissert. Abstr.

N85-17061 Department of the Air Force, Washington, D.C.
METHOD FOR INTRODUCING FLUORINE INTO AN AROMATIC RING Patent
K. O. Christe and C. J. Schack, inventors (to Air Force) Issued 9 Oct. 1984 6 p
(AD-D011397; US-Patent-4,476,337; US-Patent-Appl-SN-534030; US-Patent-Class-570-148) Avail: US Patent and Trademark Office CSCL 07/2

The present invention concerns itself with a method for introducing fluorine into an aromatic ring structure by using NF4BF4 as a reaction reagent. The introduction is accomplished by an electrophilic substitution reaction in which up to five hydrogen atoms in the aromatic ring can be substituted by fluorine atoms. The reaction can be carried out by either adding the aromatic compound, such as benzene in vapor form, to a cooled solution of NF4BF4 in HF or, alternatively, by adding slowly a solution of NF4BF4 to a solution of benezene in HF. GRA

N85-17062# York Univ., Downsview (Ontario). Dept. of Chemistry.
CORRELATION OF ELECTRONIC CHARGE TRANSFER TRANSITIONS AND ELECTROCHEMICAL POTENTIALS. THE BIPY-

RAZINE(TETRACARBONYL)MOLYBDENUM(O) SYSTEM IN VARIOUS SOLVENTS Technical Report, Oct. 1983 - Oct. 1984

E. S. Dodsworth and A. B. P. Lever Oct. 1984 19 p Submitted for publication

(Contract N00014-78-C-0592)

(AD-A147660; TR-33) Avail: NTIS HC A02/MF A01 CSCL 07/4

Using a free energy diagram, a relationship is drawn between an optical charge transfer energy and the electrochemical potentials of the detector and acceptor orbitals concerned. The charge transfer spectroscopy and electrochemical potentials of the title complex were studied in various solvents. A linear correlation, with negative slope, was observed between the difference in oxidation and reduction potentials and an MLCT transition. Using some additional solvent data, a number of useful parameters were derived in a fashion which would not be possible through consideration of either technique alone. GRA

N85-17063# SRI International Corp., Menlo Park, Calif.

COLLISION-INDUCED DIPOLE MOMENTS Final Report, Jun. - Dec. 1983

T. F. Gallagher Kirtland AFB, N. Mex. AFWL Oct. 1984 37 p

(Contract F29601-83-K-0043)

(AD-A147682; AFWL-TN-84-22) Avail: NTIS HC A03/MF A01 CSCL 07/4

Experimental studies of collision induced absorption of forbidden transitions have been conducted on Cs(6s sub 1 /2 5d sub 5/2), Na (nd sub 3/2 - nf sub 5/2) and Na (nd sub 3/2 ng sub 7/2), n is greater than or = to 15. Perturbers utilized include heavy rare gases, molecular dipoles, and positive ions. A very strong enhancement of the forbidden Rydberg transitions in Na was observed and attributed to ionic space charge. GRA

N85-17064# British Columbia Univ., Vancouver. Dept. of Chemistry.

ELECTRONICALLY EXCITED ATOMIC AND MOLECULAR OXYGEN Final Technical Report, 1 Mar. 1979 - 30 Jun. 1984

E. A. Ogryzlo 15 Aug. 1984 17 p

(Grant AF-AFOSR-0088-79)

(AD-A147732; AFOSR-84-0904TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

The rates and mechanisms through which the electronically excited states of oxygen are formed and destroyed in the upper atmosphere have been studied in a discharge flow system. Using a technique in which excited states are formed by surface catalyzed recombination, rate constants have been obtained for the quenching of the O2(A), O2(c) and O (singlet S) states by atmospheric species. The yields of the electronically excited states O2(singlet delta), O2(singlet sigma) and O(singlet S) in atom recombination have been determined directly. Evidence has been found for the existence of a precursor in each of these systems. The rate laws for the formation of O2(A), O2(c) and O(singlet S) have been established and rate constants for some of the elementary steps have been determined by combining these rate laws with the results of quenching experiments. GRA

N85-17065# Rochester Univ., N. Y. Dept. of Chemistry.

PHASE-DISSIPATIVE MECHANISMS FOR LASER-INDUCED SURFACE DESORPTION-DISSOCIATION PROCESSES Interim Technical Report

X. Y. Huang, T. F. George, J. M. Yuan, and L. M. Narducci Oct. 1984 16 p Prepared in cooperation with Drexel Univ., Philadelphia

(Contract N00014-80-C-0472)

(AD-A147961; UROCHESTER/DC/84/TR-56) Avail: NTIS HC A02/MF A01 CSCL 07/4

Vibrational excitation and relaxation for a molecule adsorbed on a surface is investigated in connection with desorption/dissociation processes. The population equations for a laser driven anharmonic oscillator involving both energy- and phase-relaxation mechanisms are derived with the Zwanzig projector technique and eigenfunction-expansion method due to Weidlich. Phase relaxation is seen to assist in the excitation of the resonant active mode. GRA

N85-17066# Naval Research Lab., Washington, D. C. Lab. for Computational Physics.

APPLICATIONS OF MOLECULAR DYNAMICS TO THE STUDY OF SHOCK-INDUCED CHEMISTRY Annual Project Report

Elaine S. Oran Oct. 1984 12 p

(NR Proj. 602-013)

(AD-A148017) Avail: NTIS HC A02/MF A01 CSCL 07/4

The goal of this program is to develop and apply molecular dynamics techniques to problems in shock-induced chemistry in reactive and non-reactive materials. The three major thrusts of the work proposed are: (1) To develop phenomenological submodels of molecular interactions that can be used in full molecular dynamics calculations. In particular, to develop models which include known quantum mechanical properties of atoms and molecules; (2) To develop a model for doing many particle interactions on a vector computer; and (3) To apply the resulting numerical models to problems of shocks in condensed phase materials. GRA

N85-17067# Northwestern Univ., Evanston, Ill. Dept. of Mechanical Engineering.

CATALYTIC IGNITION AND COMBUSTION OF LEAN MIXTURES Final Report

C. K. Law 1984 160 p

(Contract N00014-80-C-0586)

(AD-A148101) Avail: NTIS HC A08/MF A01 CSCL 21/2

Ignition and heat release rates of fuel/oxygen/nitrogen over platinum wires are experimentally studied using micro-calorimetry, aiming to gain additional understanding on the complex transport and kinetic processes involved during catalytic oxidation so as to relate the macroscopic observables with the microscopic behavior. The fuels studied are propane, butane, propylene, ethylene, carbon monoxide and hydrogen. Parameters investigated include catalyst surface temperature, fuel and oxygen concentrations, and flow velocity. Results show that for very low Reynolds number flows the flow velocity has negligible influences on the ignition temperature. Its influence on the heat release rates is also negligible but only for the reactions in kinetically controlled regime. Variation of fuel concentration is found to be an important factor in that the ignition temperatures of propane and butane decrease as their concentrations are increased from lean to rich mixtures while the opposite trend is observed for propylene, ethylene, carbon monoxide and hydrogen. GRA

N85-17068# Texas A&M Univ., College Station. Dept. of Chemistry.

RESEARCH IN PHASE TRANSFER CATALYSIS Contractor Report, Dec. 1979 - Dec. 1980

J. H. Fendler Aug. 1984 24 p

(Contract DAAK11-79-C-0111; DA Proj. 1L1-61102-A-71-A)

(AD-A148286; CRDC-CR-84083) Avail: NTIS HC A02/MF A01 CSCL 07/4

Mechanisms for the hydrolysis of paratoluenesulfonyl fluoride (PTSF) in the aqueous sodium hydroxide cyclohexane two-phase system have been elucidated for different phase transfer catalysts. The mechanism for the hydrolysis is composite; it involves both interfacial and phase transfer catalysis. Experimental conditions determine the mechanism(s) which prevails. Author (GRA)

N85-17069# Washington Univ., Seattle. Dept. of Chemistry.

CHEMICAL INFORMATION FROM ION SCATTERING SPECTROMETRY Interim Technical Report

D. J. Veltkamp and B. R. Kowalski 1 Nov. 1984 23 p

(Contract N00014-75-C-0536)

(AD-A148287; TR-31) Avail: NTIS HC A02/MF A01 CSCL 07/4

Theory of oscillations in backscattered ion intensity with incident ion energy in Ion Scattering Spectroscopy is reviewed and the analytical potential of this phenomena in surface analysis is demonstrated for a series of closely related lead compounds with

the incident energy of the helium probe ion ranging from 500 eV to 4000 eV. These data show Oscillatory Ion Scattering Spectrometry to be very sensitive to the chemical environment of the target atom and so can be used to positively identify the chemical species where ISS cannot. GRA

N85-17070# Science Applications, Inc., Chatsworth, Calif. Combustion Science and Advanced Technology Dept.
COMBUSTION IN HIGH SPEED AIR FLOWS Final Report
R. B. Edelman and P. T. Harsha Jul. 1984 124 p
(Contract F49620-80-C-0082)
(AD-A148371; AFOSR-84-0924TR) Avail: NTIS HC A06/MF A01 CSCL 21/2

The overall objective of this study is the analysis of reacting multiphase flows in advanced air-breathing propulsion systems. This work involves the formulation and evaluation of new theoretical descriptions of multiphase turbulent mixing and chemical kinetic phenomena in subsonic and supersonic air flows, and the generation of new experimental data on these phenomena. Topics studied include: Spray Modeling; Modeling of Boron Combustion Processes; Modeling of Ramjet Combustion Processes: and Modeling of the Ducted Rocket Combustion Process. GRA

N85-17071# Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
BASIC INSTABILITY MECHANISMS IN CHEMICALLY REACTING SUBSONIC AND SUPERSONIC FLOWS Annual Technical Report, 30 Sep. 1983 - 29 Sep. 1984
T. Y. Toong 18 Oct. 1984 21 p
(Grant AF-AFOSR-0373-83)
(AD-A148408; AFOSR-84-1115TR) Avail: NTIS HC A02/MF A01 CSCL 21/2

Temporal development of spectral changes in the thermal structure of premixed, rod-stabilized, lean methane-air V-flames was examined as a quasi-laminar flame (in the absence of grid-generated turbulence) propagated into the wake region of a neighboring cylindrical rod of different diameters. Significant changes in the spectral structure were observed. In the presence of turbulence-generating grids or disturbance wakes, there was an increase in the intensities of the smaller eddies within the flame brush, thus resulting in higher apparent turbulent-flame-propagation speeds due to rate-augmentation. Examination of the effects of the equivalence ratio and the turbulence scale and intensity showed the possible role of the coupling between chemical kinetics and turbulence in augmenting the high-frequency fluctuations. A one-component Laser-Doppler-Velocimetry system was purchased and a traversing mechanism was being constructed. Author (GRA)

N85-17072# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
ESTIMATION OF THE RATE OF ELECTRON TRANSFERS BETWEEN 2 CONTACTING POLYMER SURFACES
C. R. Leidner and R. W. Murray 26 Oct. 1984 15 p
(Contract N00014-82-K-0337)
(AD-A148416; TR-12) Avail: NTIS HC A02/MF A01 CSCL 07/4

A bilayer of redox polymer films, Pt/poly-Os(bpy)2(vpy)2(2+)/polyRu(vbpy)3(2+), is coated on a Pt electrode. Reduction of the poly-Ru(3+) outer film of a pre-oxidized bilayer, Pt/poly-Os(3+)/poly-Ru(3+) is controlled by the rate of electron diffusion through the inner, polyOs(2+)/(3+) film. When oxidizing the outer poly-Ru(2+) film of a reduced Pt/poly-Os(2+)/poly-Ru(2+) bilayer, however, the rate of oxidation depends largely on the kinetics of electron transfer between the ca. monolayer of poly-Os(3+) and poly-Ru(2+) sites in contact at the interface between the two polymer films. The electron diffusion kinetics in the two polymer films perturb the interfacial reaction rate only slightly, so that a lower limit to the interfacial electron transfer rate constant is available. GRA

N85-17073# American Cyanamid Co., Stamford, Conn. Chemical Research Div.
AN INVESTIGATION OF CHEMILUMINESCENT REACTIONS Final Summary Technical Report
B. H. Baretz, W. J. Trzaskos, L. Elliott, D. L. Dauplaise, and R. R. Hautala Jun. 1984 55 p
(Contract N00014-82-C-0202)
(AD-A148460) Avail: NTIS HC A04/MF A01 CSCL 07/4

The utilization of aqueous environments as media for peroxyoxalate chemiluminescence of rubrenesulfonate was further explored. The fluorescence and chemiluminescence of rubrenesulfonate was found to increase with the addition of Deceresol NI, a nonionic surfactant, and polyvinylpyrrolidone (PVP), a nonionic water-soluble polymer. Although the chemiluminescence of rubrehesulfonate was found to be enhanced in the presence of sodium decylsulfate (SDeS), no enhancement was observed for its fluorescence. However, in the presence of hexadecyltrimethylammonium chloride (HDTCl), the fluorescence of rubrensulfonate was enhanced, while no influence on its peroxyoxalate chemiluminescence was observed. The greatest chemiluminescence enhancement was noted with formulations that contained both PVP and SDeS, revealing a dramatic synergistic effect of surfactants with polymers on aqueous peroxyoxalate chemiluminescence. GRA

N85-17074# Birkbeck Coll., London (England). Dept. of Chemistry.
INTERACTIONS OF HYDRAZINE AND OF HYDRAZINE DERIVATIVES WITH SOIL CONSTITUENTS AND WITH SOILS Final Report, 1 Oct. 1979 - 1 Oct. 1980
M. H. B. Hayes, P. J. Isaacson, K. Y. Chia, A. M. Lees, and T. B. R. Yormah 23 Aug. 1984 132 p
(Grant AF-AFOSR-0032-80)
(AD-A148475; AFOSR-84-1118TR) Avail: NTIS HC A07/MF A01 CSCL 07/3

The clay colloidal of soil can be predicted to have a large influence on the fate of hydrazines in the soil environment. Initial degradation microcalorimetric studies have shown that this influence arises mainly through the processes of sorption and degradation. Clay minerals can reversibly sorb hydrazine, and a certain amount of strong irreversibly sorption can also occur. The colloidal clay components catalyze the degradation of the hydrazine, and in some instances cause very rapid and vigorous degradation. The two main factors which influence hydrazine sorption and degradation are the pH values of the solutions, and the exchangeable metal cations held by the clay. Author (GRA)

N85-17075# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
POTENTIAL DEPENDENCE OF ELECTRICAL CONDUCTIVITY AND CHEMICAL CHARGE STORAGE OF POLY(PYRROLE) FILMS ON ELECTRODES
B. J. Feldman, P. Burgmayer, and R. W. Murray 26 Oct. 1984 37 p
(Contract N00014-82-K-0337)
(AD-A148513; TR-11) Avail: NTIS HC A03/MF A01 CSCL 07/4

The electrical conductivity of solvent and electrolyte-wetted poly(pyrrole) films is measured, both statically and dynamically, as a function of the potential applied to an electrode in contact with the film. The applied potential determines the film oxidation state. Poly(pyrrole) electrical conductivity is ohmic and independent of potential from 0 to +0.4V vs. SSCE, and decreases and becomes less ohmic at more negative potentials. Measurements of the chemically reactive charge stored in poly(pyrrole) as a function of potential were combined with the electrical conductivity results to yield a profile of electrical conductivity vs. average charge per monomer site in the polymer. Electrical conductivity is independent of monomer charge above about 0.15 holes/monomer unit. Author (GRA)

N85-17076# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Chemical and Environmental Engineering.
COMBUSTION KINETICS OF METAL OXIDE AND HALIDE RADICALS Annual Report, 1 Dec. 1982 - 30 Nov. 1983
A. Fontijn 6 Jan. 1984 11 p

(Grant AF-AFOSR-0073-82)
(AD-A148521; AFOSR-84-1077TR) Avail: NTIS HC A02/MF A01 CSCL 21/2

Current ability to influence combustion involving metals is severely hampered by a lack of understanding and knowledge of the ways and manner by which temperature affects the rate coefficients of individual reactions and reaction channels. The commonly-used Arrhenius equation predicts a logarithmic dependence of rate coefficients on inverse temperature. This is often not the case and order of magnitude errors can result in extrapolations based on this equation. This report discussed various types of deviations from the equation observed in high-temperature fast-flow reactors. Laser-induced fluorescence measurements are used in such reactors to provide data necessary for obtaining an understanding of the oxidation reactions of boron and aluminum-containing radicals, as a function of temperature. GRA

N85-17077# Department of the Air Force, Washington, D.C.
HEATER BLOCK ASSEMBLY FOR USE IN THERMAL OXIDATION TESTING OF JET FUEL Patent Application
R. A. Harvey, inventor (to Air Force) Filed 19 Sep. 1984 12 p
(AD-D011430; US-Patent-Appl-SN-651983) Avail: NTIS HC A02/MF A01 CSCL 21/2

A heater block assembly for a jet fuel thermal oxidation test apparatus has back and front plates with a heater plate clamped therebetween. The heater plate has a flat surface which faces the front plate, while the front plate has a raised ledge with a channel formed therein which faces the flat surface of the heater plate. Also, inlet and outlet openings to opposite ends of the channel are formed through the front plate. When the back and front plates are clamped together with the heater plate therebetween the flat surface of the heater plate and the channel in the front plate together define a fuel sample flow passage. Thus, the fuel sample undergoing test is pumped through the inlet on the front plate into the flow passage where it flows along and in contact with the flat surface and then out through the outlet on the front plate. Heating rods disposed in the back plate raise the temperature of the back plate and thereby the heater plate and fuel sample, causing thermal decomposition deposits from the heated fuel to form on the flat surface of the heater plate.
Author (GRA)

N85-17078# Utah Univ., Salt Lake City. Dept. of Chemistry.
ELECTROCHEMISTRY AT VERY HIGH POTENTIALS: THE USE OF ULTRAMICROELECTRODES IN THE ANODIC OXIDATION OF SHORT CHAIN ALKANES
J. Cassidy, S. B. Khoo, S. Pons, and M. Fleischmann 28 Nov. 1984 20 p
(Contract N00014-83-K-0470)
(AD-A148654; TR-29) Avail: NTIS HC A02/MF A01 CSCL 07/4

The use of ultramicroelectrodes in aprotic solvent containing no purposefully added support electrolyte allows the observed anodic oxidation limit in acetonitrile to be considerably extended. The anodic oxidation of methane, butane, and other aliphatic alkanes is clearly observed under steady state conditions at potential up to about 3.8V (Ag+ reference). The oxidation of the solvent occurs significantly at potentials greater than 4.0V and appears to result in radical coupling reactions forming both soluble and insoluble polymers. GRA

N85-17079# Utah Univ., Salt Lake City. Dept. of Chemistry.
THE CONSTRUCTION AND BEHAVIOUR OF ULTRAMICROELECTRODES: INVESTIGATIONS OF NOVEL ELECTROCHEMICAL SYSTEMS
A. M. Bond, M. Fleischmann, S. B. Khoo, S. Pons, and J. Robinson 28 Nov. 1984 32 p
(Contract N00014-83-K-0470)
(AD-A148658; TR-38) Avail: NTIS HC A03/MF A01 CSCL 09/1

Methods of construction and the behavior of microdisc and microsphere electrodes having radii down to 1000 and 200 A respectively and of microspheres having widths down to 250 A are reviewed. The high steady state rates of mass transport and the low ohmic over potentials allow the study of systems under simple steady state conditions as well as the study of many novel systems. It is shown that the rates of fast electrode reactions can be readily measured; the kinetics of reactions in solution coupled to electrode reactions are more easily determined than by relaxation methods using planar electrodes; reactions can be examined in solvents using low or zero concentrations of support electrolyte as well as in low dielectric constant solvents. GRA

N85-17080# Utah Univ., Salt Lake City.
SUBTRACTIVELY NORMALIZED INTERFACIAL FOURIER TRANSFORM INFRARED SPECTROSCOPY OF DIFLUOROBENZENE ADSORBED AT POLYCRYSTALLINE PLATINUM ELECTRODES Dept. of Chemistry.
S. Pons and A. Bewick 28 Nov. 1984 15 p
(Contract N00014-83-K-0470)
(AD-A148660; TR-33) Avail: NTIS HC A02/MF A01 CSCL 07/3

The subtractively normalized interfacial Fourier transform infrared spectra (SNIFTIRS) of the difluorobenzenes in perchloric acid solutions show that the species are absorbed flat at low concentrations of the substrate. In concentrated solutions, the packing changes to a skewed configuration. For these molecules there is no indication of vibrational coupling to the strong electrical field at the electrode surface and the vibrational spectra are as predicted by the standard surface selection rule. GRA

N85-17081# Utah Univ., Salt Lake City. Dept. of Chemistry.
ELECTROCHEMICAL FEATURES OF THE FERRIC SULFATE LEACHING OF CuFeS2/C AGGREGATES
R. Y. Wan, J. D. Miller, J. K. Foley, and S. Pons 28 Nov. 1984 29 p
(Contract N00014-83-K-0470)
(AD-A148661; TR-36) Avail: NTIS HC A03/MF A01 CSCL 07/2

The rate of chalcopyrite dissolution by ferric sulfate solution can be enhanced by the presence of conductive carbon particles. The addition of carbon has been found to increase the leaching rate of chalcopyrite by as much as a factor of four. The importance of carbon in the enhanced leaching of chalcopyrite has been discussed in previous publications. The same rate increase has been found to prevail for the initial reaction kinetics. To further evaluate the effect of carbon during the initial stage of reaction, the results from initial rate experiments are discussed in conjunction with polarization and spectroelectrochemical measurements. GRA

N85-17082# Utah Univ., Salt Lake City. Dept. of Chemistry.
THE ADSORPTION OF ACRYLONITRILE AT A GOLD ELECTRODE: AN EMIRS MEASUREMENT OF THE ELECTROCHEMICAL STARK EFFECT
A. Bewick, C. Gibilaro, and S. Pons 28 Nov. 1984 19 p
(Contract N00014-83-K-0470)
(AD-A148664; TR-39) Avail: NTIS HC A02/MF A01 CSCL 07/4

Electrochemically modulated infrared spectroscopy of acrylonitrile adsorbed on a gold electrode in aqueous sulphuric acid shows potential - dependent unipolar absorption bands at 2130/cm and 1520/cm. These are ascribed to heavily red shifted C N- and C=C stretches from acrylonitrile adsorbed flat on the surface by means of the pi-electron system. These bands are forbidden by the surface selection rule but are made visible by an Electrochemical Stark Effect. GRA

N85-17083# Utah Univ., Salt Lake City. Dept. of Chemistry.
MODULATED SURFACE VIBRATIONAL SPECTROSCOPIES AT ELECTRODE/ELECTROLYTE INTERFACES
S. Pons and A. Bewick 28 Nov. 1984 34 p
(Contract N00014-83-K-0470)
(AD-A148665; TR-34) Avail: NTIS HC A03/MF A01 CSCL 07/4

In this report, we will discuss the applicability of a new infrared vibrational probe to studies of the structure and orientations of

molecular species at or near the electrode-solution interface and the dynamics of adsorption/desorption processes. Such studies have been virtually impossible with available instrumentation in the past due to the extremely large absorbance by the solvent/electrolyte system. Early investigations on electrochemical systems were thus attempted primarily with internal reflectance methods that did not require that the radiation pass through the bulk solvent/electrolyte system. This method is limited, however, due to the few choices of infrared-transport electrode materials (semiconducting materials or very thin metal films on insulating transparent salts and polymers) in addition to more stringent cell designs and electrode geometries. GRA

N85-17084# Utah Univ., Salt Lake City. Dept. of Chemistry.
HOMOGENEOUS REACTION INVOLVING COMPONENTS OF DIFFERENT REDOX COUPLES. 1: THEORETICAL CONSIDERATIONS AND DIGITAL SIMULATION
S. Pons, S. B. Khoo, J. Janata, S. Feldberg, and J. K. Foley 28 Nov. 1984 27 p
(Contract N00014-83-K-0470)
(AD-A148666; TR-37) Avail: NTIS HC A03/MF A01 CSCL 07/4

Coupled heterogeneous electron transfer/homogeneous reactions occur in the electro-oxidation of certain anilines, and in association reactions of hydrocarbon anions with metal cations. If the adduct A sub m sub R is electroinactive, the resulting voltammogram is distorted in a way which is characteristic of the value of m. The derivation of the theoretical fluxes for these reactions and calculated normal potential pulse voltammograms are presented. The results are derived from both limiting flux and digital simulation considerations. Author (GRA)

N85-17085# Utah Univ., Salt Lake City. Dept. of Chemistry.
HOMOGENEOUS REACTION INVOLVING COMPONENTS OF DIFFERENT REDOX COUPLES. 2: POLAROGRAPHIC STUDIES OF THE INTERACTIONS OF ALKALI METAL CATIONS WITH ANTHRACENE AND FLUORANTHENE DIANIONS IN N,N-DIMETHYLFORMAMIDE AND ACETONITRILE
S. B. Khoo, S. Pons, J. Janata, S. Feldberg, and J. K. Foley 28 Nov. 1984 35 p
(Contract N00014-83-K-0470)
(AD-A148667; TR-40) Avail: NTIS HC A03/MF A01 CSCL 07/4

The polarographic behavior of mixtures of anthracene (An), fluoranthene (Fa) and alkali metal cations in N,N-dimethylformamide (DMF) or acetonitrile (ACN) indicates that the electrogenerated dianion of the hydrocarbon reacts with the metal cation in the diffusion layer to form ion complexes. This results, in the case of sodium or lithium cations with anthracene in both DMF and ACN, in the appearance of the invented polarographic waves. In the case of other alkali metal cations (K+, Rb+), the intensity of the polarographic wave due to the reduction to the hydrocarbon dianion is simply decreased. The stoichiometries and mechanisms of the interactions are discussed. GRA

N85-17086# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Bereich Neue Technologien.
OPTIMIZATION OF TECHNICAL CATALYSTS WITH THE HELP OF SURFACE ANALYSIS Final Report, Dec. 1982
Wolfgang Gerhard, Eilert Hamer, Otto Inacker, Carsten Plog, Max Seidl, Rainer Elm (Chemische Werke Huels AG), Claus-Dieter Mengler (Chemische Werke Huels AG), Erwin Vangermain (Chemische Werke Huels AG), Eugen Lang (Imhausen Chemie AG), and Siebgert Roesch (Imhausen Chemie AG) Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 292 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-225; ISSN-0340-7608) Avail: NTIS HC A13/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 45,50

Using surface analysis a procedure was worked out allowing a more purposeful development of technical catalysts. The procedure is completed by development of analysis and evaluation methods and is tested with synthesis of styrene (iron oxide catalyst), oxidation of ethylene (silver catalyst), synthesis of polymethylene (ruthenium catalyst) and NO-reduction (platinum-and semiconductor catalyst). Information about processes at the catalyst surface is gained by correlating measured surface and kinetic data. Proposals to optimize the reactions and catalyst systems are worked out.
Author (ESA)

N85-17087# Battelle Inst., Frankfurt am Main (West Germany). Fachbereich Chemie und Biologie.
RESEARCH AND DEVELOPMENT WORK CONCERNING LIQUID MEMBRANES Final Report, Oct. 1982
Doris Hartmann, Albrecht Klimmek, and Wolfram Krieger Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 65 p refs In GERMAN; ENGLISH summary
(BMFT-FB-T-84-227; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 13,50

Thin membranes, carriers of small molecular size, and high carrier concentrations in organic solvents of low viscosity were studied to improve the effectiveness of supported liquid membranes. Processes taking place at elevated temperatures were investigated. The influence of membrane components on service life was studied and membrane composition was optimized. Membranes with a service life $>$ 20 weeks were manufactured. Membranes with SME 529 or LIX 65 N as carrier, kerosene as solvent and porous polypropylene or polytetrafluoroethylene as support are the most stable. Author (ESA)

N85-17088# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
NUMERICAL CALCULATION OF THE COLD-FLOW CHARACTERISTICS OF A BLUFF-BODY FLAME STABILIZER
J. O. Ilegbusi and D. B. Spalding Jul. 1984 27 p refs Sponsored by UK Science and Engineering Research Council
(CFD-84/14) Avail: NTIS HC A03/MF A01

The numerical prediction of turbulent flow behind a wedge-shaped flame stabilizer is described. The wedge is represented as a blockage in the flow. A model of turbulence characterized by the turbulence energy and a measure of the time-mean-square of the vorticity fluctuations is employed. The flow situations include cases with and without a nozzle upstream of the bluff body that simulates a lean-mixture combustor. Results based on these features are compared with the data for a 45 deg wedge angle. The predicted and measured size of the recirculation zone, mean velocity, pressure coefficients, shear stresses and turbulence energy are in fair agreement downstream of the stabilizer.
Author (ESA)

N85-17089# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
THE TWO-FLUID MODEL OF TURBULENCE APPLIED TO COMBUSTION PHENOMENA
D. Brian Spalding Oct. 1984 56 p refs Presented at 22nd AIAA Aerospace Sci. Meeting, Reno, Nev., 9-12 1984 Sponsored by UK Science and Engineering Research Council, UK Health and Safety Executive, the US Army European Office and UK Atomic Weapons Research Establishment
(CFD-84/15) Avail: NTIS HC A04/MF A01

Turbulent fluids are treated as random interspersions of two fluids, each possessing its own temperature, composition, velocity components, etc, and interacting through the sharing of space and the exchange of mass, momentum and energy. The model is applied to transient combustion of premixed fuel gas and air, partially confined in a duct. Research on two-dimensional steady flame phenomena is summarized. Author (ESA)

N85-17032# Centre de Recherches du Bouchet, Vert de Petit (France).
STUDY OF THE TRANSITION FROM DEFLAGRATION TO DETONATION OF PREVIOUSLY FRAGMENTED PROPELLANTS [ETUDE DE LA TRANSITION DE LA DEFLAGRATION A LA DETONATION DES PROPERGOLS PREALABLEMENT FRAG-

MENTES]
J. Brunet and J. L. Paulin *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 22 p refs In FRENCH (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17037# Naval Weapons Center, China Lake, Calif. Engineering Sciences Div.
TRANSIENT COMBUSTION: AN IMPORTANT CONSIDERATION IN DEFLAGRATION-TO-DETONATION TRANSITION
T. L. Boggs, C. F. Price, and R. L. Derr *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 16 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17039# Centre de Recherches du Bouchet, Vert de Petit (France).
NUMERICAL SIMULATION OF THE SHOCK DETONATION TRANSITION [SIMULATION NUMERIQUE DE LA TRANSITION CHOC DETONATION]
B. Nouguez, A. Bertrand, and J. Mala *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 10 p refs In FRENCH (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N85-17090 British Library Lending Div., Boston Spa (England).
REPLACEMENT OF Fe-3+ IONS IN NICKEL FERRITES BY NONMAGNETIC Al-3+ AND Sc-3+ IONS
M. M. Miranashvili and T. I. Kakushadze 19 Sep. 1984 5 p ref Transl. into ENGLISH from Soobshch. Akad. Nauk Gruz. SSR (USSR), v. 51, no. 3 p 568
(BLL-WH-594-(9091.9F)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

The replacement of Fe (3+) ions by the nonmagnetic ions Al(3+) and Sc(3+) ions is a promising approach to study nickel ferrites. Neel's theory is compared to experimental results. B.G.

N85-17091 United Kingdom Atomic Energy Authority, Risley (England).
EXPERIMENT ON TRIGGERED FRAGMENTATION ON A MOLTEN COPPER DROPLET IN WATER
M. Ando Apr. 1984 116 p refs Transl. into ENGLISH of rept. KfK-3667 Inst. fuer Reaktorentwicklung, Karlsruhe, West Germany, Dec. 1983
(BLL-WH-602-(9091.9F); KfK-3667) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

Fragmentation in normal atmosphere; experiments in a reducing atmosphere; fragmentation mechanism; steam-water interface; time-cure characteristics; grain size distribution and specific surfaces; and steam explosion are discussed. B.G.

N85-17092*# National Aeronautics and Space Administration, Washington, D. C.
ON REVERSION PHENOMENA IN Cu-Zr-Cr ALLOYS
Hiroshi Suzuki, Hitoshi Kitano, and Motohiro Kanno Jan. 1985 15 p refs Transl. into ENGLISH from Nippon Kinzoku Gakkaishi (Japan), v. 33, no. 3, 1968 p 334-338 Presented at Japan Inst. of Metals Conf., Tokyo, Apr. 1968 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original document prepared by Tokyo Univ.
(Contract NASw-4004)
(NASA-TM-77791; NAS 1.15:77791) Avail: NTIS HC A02/MF A01 CSCL 11F

Reversion phenomena in aged Cu-0.12% Zr-0.28% Cr alloy were investigated by means of resistivity measurement and transmission electron microscopy and compared with those of Cu-0.30% Zr and Cu-0.26% Cr alloys. Specimens in the form of a 0.5 mm sheet were solution-treated at 950 F for 1 hr water-quenched, aged, and finally reversed. The reversion phenomena were confirmed to exist in Cu-Zr and Cu-Zr-Cr alloys as well as Cu-Cr alloys, at aging temperatures of 300 to 500 F. The critical aging temperature for the reversion was not observed in all the alloys. Split aging increased the amount of reversion, particularly in Cu-Zr and Cu-Zr-Cr alloys, compared with that by conventional aging. The amount of reversion in Cu-Zr-Cr alloy was greatly affected by the resolution of Cr precipitate formed by preaging. Structural changes in Cu-Zr-Cr alloy due to the reversion were hardly observed by transmission electron microscopy. R.S.F.

N85-17093*# Eloret Corp., Sunnyvale, Calif.
RESEARCH PROGRAM TO STUDY TRANSITION METAL TRIMERS AND EMBEDDED CLUSTERS Semiannual Progress Report, 1 Jul. 1984 - 31 Dec. 1984
Stephen P. Walch 31 Dec. 1984 55 p refs
(Contract NCC2-096)
(NASA-CR-174296; NAS 1.26:174296) Avail: NTIS HC A04/MF A01 CSCL 11F

Small transition metal clusters were studied at a high level of approximation, including all the valence electrons in the calculation and extensive electron correlation, in order to understand the electronic structure of these small metal clusters. By comparison of dimers, trimers, and possibly higher clusters, the information obtained was used to provide insights into the electronic structure of bulk transition metals. Small metal clusters are currently of considerable experimental interest and some information is becomming available both from matrix electron spin resonance studies and from gas phase spectroscopy. Collaboration between theorists and experimentalists is thus expected to be especially profitable at this time since there is some experimental information which can serve to guide the theoretical work. R.S.F.

N85-17094*# National Aeronautics and Space Administration, Washington, D. C.
REVERSION PHENOMENA OF Cu-Cr ALLOYS
S. Nishikawa, K. Nagata, and S. Kobayashi Jan. 1985 17 p refs Transl. into ENGLISH from Nippon Kinzoku Gakkaishi (Japan), v. 30, no. 8, 1966 p 760-765 Presented at Conf., Tonnyrama, Japan, Oct. 1964 Transl. by The Corporate Word, Inc., Pittsburgh Original document prepared by Inst. of Industrial Science, Tokyo Univ.
(Contract NASw-4006)
(NASA-TM-77780; NAS 1.15:77780) Avail: NTIS HC A02/MF A01 CSCL 11F

Cu-Cr alloys which were given various aging and reversion treatments were investigated in terms of electrical resistivity and hardness. Transmission electron microscopy was one technique employed. Some results obtained are as follows: the increment of electrical resistivity after the reversion at a constant temperature decreases as the aging temperature rises. In a constant aging condition, the increment of electrical resistivity after the reversion increases, and the time required for a maximum reversion becomes shorter as the reversion temperature rises. The reversion phenomena can be repeated, but its amount decreases rapidly by repetition. At first, the amount of reversion increases with aging time and reaches its maximum, and then tends to decrease again. Hardness changes by the reversion are very small, but the hardness tends to soften slightly. Any changes in transmission electron micrographs by the reversion treatment cannot be detected.R.S.F.

N85-17095# Naval Research Lab., Washington, D. C.
PROCEEDINGS OF THE 2ND WORKSHOP ON NONDESTRUCTIVE EVALUATION (NDE) OF TITANIUM ALLOYS
N. K. Batra, H. H. Chaskelis, and O. P. Arora Jul. 1984 301 p Workshop held in Orlando, Fla., 2-4 Feb. 1982
(RR02202)
(AD-A147626) Avail: NTIS HC A14/MF A01 CSCL 11/6

Various NDE (Nondestructive Evaluation) techniques based on acoustical, electromagnetic and nuclear physics principles were investigated to evaluate quantitatively the oxygen contamination levels (varying from 0.075 percent to 0.29 percent by wt.) in NRL

supplied titanium plate samples. These edited proceedings present the results of these investigations (which were also presented at The Second Workshop). For individual titles, see N85-17096 through N85-17110.

N85-17096# Naval Research Lab., Washington, D. C.
NDE (NONDESTRUCTIVE EVALUATION) OF OXYGEN CONTAMINATED TITANIUM ALLOYS AND WELDMENTS
H. H. Chaskelis and N. K. Batra *In its* Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 3-7 (For primary document see N85-17095 08-26)
(AD-P004121) Avail: NTIS HC A14/MF A01 CSCL 11/6

This paper provides an overview of progress made on the NDE of homogeneously contaminated Ti-6211 alloys. It discusses the future work that is needed to address the practical NDE problems which may arise in these alloys and their welds. Problem areas include inhomogeneity in the distribution of oxygen; the presence of their contaminants such as Co2, N2, H, etc.; critical flaw size relative to the grain size; and variations in the microstructure due to causes other than oxygen contamination. GRA

N85-17097# Naval Research Lab., Washington, D. C.
EFFECTS OF OXYGEN ON THE MICROSTRUCTURE AND PROPERTIES OF TITANIUM 6211 ALLOYS
M. A. Inam, B. B. Rath, A. C. Ehrlich, and D. J. Gillespie *In its* Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 9-31 (For primary document see N85-17095 08-26)
(AD-P004122) Avail: NTIS HC A14/MF A01 CSCL 11/6

A systematic investigation has been conducted to evaluate the role of oxygen in modifying the microstructure and properties of Ti-6Al-2Cb-1Ta-1Mo alloy. Variation of oxygen 0.075 to 0.290 wt. percent was found to significantly reduce the prior-beta grain size without discernable changes in the transformed widmanstatten structure or crystallographic texture in the beta processed condition. Resulting from alpha stabilization effect, oxygen increases the beta transus temperature at an approximate rate of 13 degree C per 0.1 wt. percent increase in oxygen content. Oxygen, within the range of this investigation, solution strengthens the alloys by linearly increasing the overall hardness and tensile properties. Variation in oxygen was found to alter both low temperature resistivity and superconducting temperature. For example, the superconducting temperature is found to increase from 3.1K to 4K when oxygen concentration changes from 0.075 to 0.290 wt. percent. GRA

N85-17098# United Technologies Research Center, East Hartford, Conn.
NONLINEAR ULTRASONIC CHARACTERIZATION OF OXYGEN IMPURITIES IN TITANIUM
H. I. Ringermacher and R. S. Williams *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 35-48 (For primary document see N85-17095 08-26)
(AD-P004123) Avail: NTIS HC A14/MF A01 CSCL 11/6

Titanium specimens containing oxygen impurities ranging from 0.1 to 0.5 percent by weight have been examined using nonlinear ultrasonic techniques. Second harmonic amplitude deviation from the expected square law behavior has been observed. This is consistent with theory relating dislocations and impurity content to ultrasonic and third harmonic generation in materials. The results of these tests are presented and directions for future work outlined. Author (GRA)

N85-17099# Southwest Research Inst., San Antonio, Tex.
EFFECTS OF OXYGEN-CONTAMINATION-INDUCED MICROSTRUCTURAL CHANGES ON THE REVERBERATION OF ULTRASOUND IN TI-6211 ALLOYS
G. J. Gruber and G. J. Hendrix *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 49-69 (For primary document see N85-17095 08-26)
(AD-P004124) Avail: NTIS HC A14/MF A01 CSCL 11/6

Titanium alloys of extral low oxygen levels are necessary for manned, deep-diving naval vessels because small amounts of dissolved oxygen markedly increase the brittleness of these alloys at low temperatures. The lack of reliable and an accurate nondestructive method for the determination of interstitial oxygen contamination of titanium forgings and weldments is a serious problem. A pulse-echo ultrasonic technique was used to measure the decay of ultrasound in five Ti-6211 alloy plate specimens containing known concentrations of dissolved oxygen (from 0.075 to 0.290 percent by weight). Surface conditions of the immersed plates had no influence on the ultrasonic results obtained for the bulk of the test specimens. Both the time-specific amplitude and decay rate of the spatially averaged reverberation curves proved to be sensitive indicators of the microstructural variations among the test specimens. The correlation between the ultrasonic-reverberation and oxygen contamination levels was found to be significant ($p < 0.08$). The present study has confirmed that interstitial oxygen in Ti-6211 forgings and weldments can be monitored through its microstructure mediated effect on the reverberation of a focusable interrogating ultrasonic beam. Author (GRA)

N85-17100# Johns Hopkins Univ., Baltimore, Md. Dept. of Materials Science and Engineering.
ACOUSTICAL CHARACTERIZATION OF TI-6211 WELDMENTS AND OXYGEN CONTAMINATION TI-6211 PLATE
S. R. Buxbaum and R. E. Green, Jr. *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 71-95 (For primary document see N85-17095 08-26)
(AD-P004125) Avail: NTIS HC A14/MF A01 CSCL 11/6

The use of ultrasonic testing for the inspection of weldments in titanium alloys requires careful acoustical characterization of the materials and weldments in question. In the first part of the present work various ultrasonic tests were conducted on a series of test specimens of titanium alloy weldments and base plate material. Ultrasonic wave velocity and attenuation measurements were made in the low megahertz frequency range using both longitudinal and shear waves. Both the ultrasonic wave velocity and attenuation were observed to be lower in the weld region than in the base metal. Information provided by X-ray analysis helped to account for the observed wave velocity behavior. Changes in the attentuation were correlated to microstructural variations and hardness measurements in the weld region and base metal. The second stage of the research focused on the problem of dissolved gas contamination of Ti-6211 welded joints. In order to evaluate the feasibility of ultrasonic testing for detecting quantitatively the presence of interstitial gas contamination in weldments of Ti-6211, ultrasonic wave velocity and ultrasonic attenuation measurements were performed on a series of five specimens with nominal oxygen levels of 0.1, 0.2, 0.3, 0.4, and 0.5 percent by weight. Careful density measurements in addition to the ultrasonic wave velocity data enabled accurate determination of elastic moduli. Author (GRA)

N85-17101# Purdue Univ., Lafayette, Ind.
ULTRASONIC EVALUATION OF TITANIUM CONTAMINATION WITH CORRELATION TECHNIQUES
E. S. Furgason, B. B. Lee, and G. O. Deputy *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 97-111 (For primary document see N85-17095 08-26)
(AD-P004126) Avail: NTIS HC A14/MF A01 CSCL 11/6

Direct ultrasonic evaluation of local variations in material composition is possible when these compositional variations induce measurable changes in the local elastic properties of microstructure of the material. In this study two standard classes of measurements are evaluated for their performance in the particular problem of quantitatively determining levels of interstitial oxygen contamination in titanium. The results of time-of-flight and frequency dependent attenuation measurements are presented for the case of finished flat titanium plates which have homogeneous interstitial oxygen contamination. These measurements were obtained using sensitive correlation techniques which were not required for these initial measurements, but which should prove beneficial in more practical contaminant situations. The applicability of such ultrasonic mea-

surements are also examined for the case of more general inhomogeneous structures with rough surfaces. Author (GRA)

N85-17102# Wayne State Univ., Detroit, Mich. Dept. of Physics.

PHOTOACOUSTIC MICROSCOPY OF OXYGEN CONTAMINATED TITANIUM ALLOYS

R. L. Thomas and L. D. Favro *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 113-124 (For primary document see N85-17095 08-26)
(AD-P004127) Avail: NTIS HC A14/MF A01 CSCL 11/6

The photoacoustic microscope is a device which uses a chopped laser beam as a modulated heat source and an acoustic cell and a detector to measure the microscopic thermal properties of materials. The result is a micrograph of the variations of the near surface thermal properties of the sample. As such it is a useful device for observing defects and the near subsurface grain structure of materials. Such structure is expected to be affected by nonsubstitutional impurities such as oxygen in titanium. This technique was applied to the five samples of titaniumn alloy. The samples were first machined flat and polished to remove the disturbed surface region and tool marks which were present when they were received. Individual photoacoustic micrographs were taken of each sample and then comparative photoacoustic micrographs were taken of pairs of samples within the same cell to eliminate systematic errors due to variations of cell properties. These micrographs indicated small differences in the microscopic structures in the various samples but these differences appear to be overwhelmed by the gross variations in grain structure apparently induced by the rolling processes, etc. Rather large variations in structure were observed from point to point in the same sample, making it difficult to make meaningful comparison between samples. Micrographs which indicate the differences and similiarities of the samples will be presented. Author (GRA)

N85-17103# General Dynamics Corp., Groton, Conn. Electric Boat Div.

HIGH RESOLUTION ACOUSTIC MICROSTRUCTURAL CHARACTERIZATION OF TITANIUM WITH INTERSTITIAL CONTAMINATION

A. M. Greenburg, D. E. Yuhas, and M. G. Oracvecz *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 125-141 (For primary document see N85-17095 08-26)
(AD-P004128) Avail: NTIS HC A14/MF A01 CSCL 11/6

This investigation deals with observations relating to the acoustic characterization of the microstructure of titanium. The main idea is to relate weld integrity, or in this particular case, the level of interstitial gas contamination contained in titanium to variations in acoustic properties. The Scanning Laser Acoustic Microscope was used to obtain both images and quantitative attenuation and velocity data. Acoustic frequencies of 100 MHz and 30 MHz were used. Two different titanium alloys were tested. These include nonwelded Ti-6211 alloys as well as welded Ti-6Al4V alloys. Results indicate that substantial variations in acoustic characteristics are observed and can be correlated with the level of interstitial gas contamination. Specifically, the average acoustic attenuation is found to increase with the level of interstitial contamination. Also, the acoustic characteristics of the sample become more nonuniform or inhomogeneous with increasing contamination level. This is evidenced by large variations in the local attenuation properties (on scale of a few hundred microns). Associated with the inhomogeneous attenuation characteristics are large, discontinuous sonic velocity variations. Author (GRA)

N85-17104# Adaptronics, Inc., McLean, Va.

FEASIBILITY STUDY TO DEMONSTRATE DETECTION OF LOW LEVELS OF OXYGEN CONTAMINANT IN TITANIUM USING EDDY CURRENT AND ULTRASONIC NDE (NONDESTRUCTIVE EVALUATION) TECHNIQUES

S. N. Vernon, J. M. Jamieson, and A. N. Mucciardi *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 145-171 (For primary document see N85-17095 08-26)
(AD-P004129) Avail: NTIS HC A14/MF A01 CSCL 11/6

An eddy current and two ultrasonic techniques were employed to establish the feasibility of detecting low levels of oxygen contaminant in 6-2-1-1 titanium plates. The eddy current technique consisted of two probes used in a transmit/receive mode. The transmitter was stationary and generated eddy currents at driving frequencies between 250 kHz and 1 MHz. The receiver was varied in distance from the transmitter over a 0.125 to 1.0 inch range. It was found that the eddy current response was independent of oxygen content over the frequency and distance range considered. One ultrasonic technique measured the ratio of longitudinal velocities at 5 MHz and 20 MHz. No strong correlation was found between the velocity ratio and oxygen content. The second ultrasonic technique measured the ratio of the shear wave velocity to the longitudinal wave velocity at 5 MHz, where each wave traveled normal to the surface of the plate. A strong correlation was found between the velocity ratio and oxygen content. It is concluded that the shear/longitudinal velocity is related to the oxygen content. A proposed field implementation using this technique is presented. GRA

N85-17105# Southwest Research Inst., San Antonio, Tex.

EVALUATION OF INTERSTITIAL GAS CONTAMINATION IN TITANIUM ALLOYS USING INDUCED MAGNETIC FIELD ANALYSIS

K. J. Krzywosz *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 173-192 (For primary document see N85-17095 08-26)
(AD-P004130) Avail: NTIS HC A14/MF A01 CSCL 11/6

The use of induced magnetic field and the resultant material reaction from titanium alloys containing interstitial gas contamination was evaluated. This presentation discusses the material conductivity changes noted as evaluation of five titanium specimens was conducted. The oxygen contamination levels in the specimens ranged from 0.075 percent by weight to 0.290 percent by weight. A quantitative evaluation was conducted with difficulty due to inhomogeneity of contamination levels noted from some of the evaluated specimens. Consequently, an averaged signal response from the specimen surface was necessary. The averaged signal response corresponding to material conductivity changes was then correlated to various levels of oxygen contamination.
Author (GRA)

N85-17106# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.

ELECTROMAGNETIC NDE OF INTERSTITIAL CONTAMINATION IN TITANIUM ALLOY WELDMENTS

R. M. Rose *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 173-192 (For primary document see N85-17095 08-26)
(AD-P004131) Avail: NTIS HC A14/MF A01 CSCL 11/6

The direct effect of dissolved oxygen and other interstitials on the electrical resistivity of titanium alloys is generally small relative to the resistivity of the alloy itself. However, there are special cases where the microstructural effects (e.g., alpha precipitation of the oxygen may be large enough to cause detectable changes in the resistivity. This effect was measured by four-point probe and ac susceptibility, in five Ti-6211 specimens and seven Ti-6Al-4V weldments provided by an ONR-sponsored project at M.I.T. In the forged and annealed Ti-6211 specimens, there was no detectable relationship between the resistivity/susceptibility and the oxygen content. On the other hand, the weld metal specimens did exhibit measurable oxygen sensitivity, approximately 7 percent of the base resistivity per pct. oxygen. Control experiments on the base metal from the weldments showed a resistivity variation of 1 percent or less. Microstructural effects of oxygen contamination on electrical resistivity of weldments are large enough to measure; these effects are wiped out by annealing. Thus, the resistivity/susceptibility method cannot be used generally on Ti alloys regardless of history but is a valid and convenient specific approach to NDE of Ti welds. GRA

N85-17107# Allis-Chalmers Mfg. Co., York, Pa. Nuclear Components Div.
EVALUATION OF THE THERMOELECTRIC METHOD FOR DETERMINATION OF INTERSTITIAL GASES IN TITANIUM
H. J. Marks and F. G. Karchnak *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 215-242 (For primary document see N85-17095 08-26)
(AD-P004132) Avail: NTIS HC A14/MF A01 CSCL 11/6

Allis-Chalmers (A-C) investigated the use of a thermoelectric method for determining interstitial gases in titanium. The test method measured the thermoelectric effect generated between the test metal and a heated, constant temperature, electrode. Various contact probe materials were evaluated. No correlation could be drawn between the controlled variable (oxygen) and the thermoelectric results. The inconsistent variation in the chemical composition of the test specimens is considered the cause for an indeterminate test. Author (GRA)

N85-17108# Science Applications, Inc., San Diego, Calif.
MEASUREMENT OF OXYGEN CONTAMINATION IN TITANIUM ALLOY INGOTS BY FAST NEUTRON ACTIVATION ANALYSIS
A. Abusamra *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 245-264 (For primary document see N85-17095 08-26)
(AD-P004133) Avail: NTIS HC A14/MF A01 CSCL 11/6

The total oxygen content of five titanium samples was determined using activation analysis with fast neutrons. The method utilizes the nuclear reaction 016(N,P)N16. The produced 16N has a half-life of 7.2 seconds and decays by emitting 6.1 MeV gamma rays. Titanium samples of variable oxygen content and benzoic acid standards incapsulated in polyethylene vials were irradiated simultaneously with 14.3 MeV neutrons produced from a fast neutron generator. They were transferred to two NaI (TL) gamma-ray counting systems and were simultaneously counted. The 6.1 MeV gamma-ray counts produced by both titanium sample and standards were and 0.27 percent with relative error of less than 5 percent. The analysis is nondestructive, fast accurate, practically interference free, and can reach 100 ppm level. GRA

N85-17109# Scientific Measurement Systems, Inc., Austin, Tex.
NEUTRON ACTIVATION ANALYSIS OF TITANIUM WITH OXYGEN CONTAMINATION
I. L. Morgan *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 265-282 (For primary document see N85-17095 08-26)
(AD-P004134) Avail: NTIS HC A14/MF A01 CSCL 11/6

Measurements of trace amounts of elements in a given composition is of great interest in many areas of industrial as well as academic activities. There are a number of methods available, such as chemical analysis, these procedures necessarily destroy the sample. Neutron activation analysis for the trace elements is an attractive and accurate method, where no destruction of the sample is warranted. The present investigations were conducted for accessing the O2 content in titanium metal samples via neutron activation analysis. The O2 content was measured to a few hundred parts per million with an accuracy of + or - 5 percent. Availability of high energy and high flux neutron generators, in addition to the results of this study, indicate that the neutron activation analysis approach to nondestructive assessment of object compositions is not only feasible but could provide an advanced, accurate and rapid technology. GRA

N85-17110# Case Western Reserve Univ., Cleveland, Ohio.
NONDESTRUCTIVE EVALUATION OF TITANIUM ALLOYS. ESCA (ELECTRON SPECTROSCOPY FOR CHEMICAL ANALYSIS), ISS (ION SCATTERING SPECTROSCOPY), AND SIMS (SECONDARY ION MASS SPECTROMETRY) EXAMINATION OF TITANIUM ALLOY SOLID SURFACES
G. D. Mateescu and Y. H. Pao *In* NRL Proc. of the Workshop on Nondestructive Evaluation (NDE) of Titanium Alloys Jul. 1984 p 283-304 (For primary document see N85-17095 08-26)
(AD-P004135) Avail: NTIS HC A14/MF A01 CSCL 11/6

This report will begin with the description of the basic principles and instrumentation of ESCA (Electron Spectroscopy for Chemical Analysis), ISS (Ion Scattering Spectroscopy), and SIMS (Secondary Ion Mass Spectrometry). Particular emphasis will be placed on those aspects which are of immediate relevance to the nondestructive evaluation of titanium alloys such as: the concept of chemical shift in ESCA, the relative surface probing sensitivities of ESCA, ISS, and SIMS, the depth profiling capabilities of these techniques. Preliminary results show that, even at moderate resolution, oxygen first orbit photoelectron spectra of at least three types of oxygen are obtained for the five different Ti alloy samples. Sputtering of the intense Ti2p photoelectron signals corresponds to an oxide which completely covers the surface of the specimen. Carbon 1s spectra served to monitor the degree of contamination. ISS-SIMS measurements provided a better insight into the Oxygen/Ti ratio on the surface and in the subsurface layers. Preliminary investigations demonstrate the feasibility of in situ studies of fracture surfaces. Instrumental modifications for the execution of such experiments are now in progress. Our conclusion is that, working in ultrahigh vacuum conditions, ESCA-ISS-SIMS (combined, perhaps, with conventional mass spectrometry) constitute adequate means to analyze the degree of surface and interstitial oxidation of Ti alloys. GRA

N85-17111# Florida Univ., Gainesville. Dept. of Materials Science and Engineering.
GRAIN REFINING AND MICROSTRUCTURAL MODIFICATION DURING SOLIDIFICATION Annual Technical Report, Sep. 1983 - Aug. 1984
G. J. Abbaschian Oct. 1984 75 p
(Contract N00014-81-K-0730)
(AD-A147705; ATR-3) Avail: NTIS HC A04/MF A01 CSCL 11/6

This is the third annual report of a research program to study grain refining and microstructural modifications during solidification, as affected by supercooling, solidification rate, and/or inoculation. The report covers results of the current investigations on the structure and phase transformations in chromium-nickel alloys (part 1), and the final report on the grain refining in copper by the addition of iron and electromagnetic stirring (part 2). High temperature phase transformations in Cr-Ni binary alloys were evaluated using microstructural, thermal, and TEM analyses of levitation melted binary alloys. The effect of iron additions in the range of 0.57 to 7.5 w/o and electromagnetic stirring of the grain size of electromagnetically levitated copper-iron alloys were investigated. GRA

N85-17112# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
ELECTRONIC STRUCTURE, CHEMICAL BONDING, AND SUPERCONDUCTIVITY OF SILVER FILMS ON GERMANIUM Interim Report
K. H. Johnson 10 Sep. 1984 19 p
(Contract N00014-81-K-0499)
(AD-A147720; TR-9) Avail: NTIS HC A02/MF A01 CSCL 20/12

The local electronic density of states and chemical bonding of a very thin Ag film on a Ge substrate have been calculated by the partitioned scattered-wave molecular-orbital method. The partial occupation of layered Ag Pi bonding molecular orbitals at the Fermi energy, resulting from covalent bonding with the Ge substrate, is responsible for the incipient superconductivity recently observed by Burns et al. for very thin epitaxially grown Ag films on Ge. These orbitals are unoccupied in nonsuperconducting pure Ag. GRA

N85-17113# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
ULTRAHIGH CARBON STEEL Final Report, 18 May 1981 - 17 Jun. 1984
O. D. Sherby, T. Oyama, D. W. Kum, B. Walser, and J. Wadsworth 1 Oct. 1984 32 p
(Contract DAAG29-81-K-0080)
(AD-A147762; ARO-18542.1-MS-A) Avail: NTIS

HC A03/MF A01 CSCL 11/6

Recent studies and results on ultrahigh carbon (UHC) steels would suggest that major development efforts on these steels are timely and that programs to evaluate prototype structural components should be initiated. These recent results include: the development of economical processing techniques incorporating a divorced eutectoid transformation, the improvement of room temperature strength and ductility by heat treatment, the enhancement of superplastic properties through dilute alloying with silicon, and the attainment of exceptional notch impact strength in laminated UHC steel composites manufactured through solid state bonding. The unique mechanical properties achieved in UHC steels are due to the presence of micron-size ferrite grains and ultrafine spheroidized carbides. GRA

N85-17114# Materials Research Labs., Ascot Vale (Australia).
ESR (ELECTROSLAG REFINING) TECHNOLOGY IN AUSTRALIA: LABORATORY RESEARCH AND INDUSTRIAL DEVELOPMENT
G. M. Weston and J. C. Ritter Jul. 1983 42 p
(AD-A147776; MRL-R-932) Avail: NTIS HC A03/MF A01 CSCL 11/6

Scientific and technical work undertaken jointly by MRL and the Commonwealth Steel Company, during a period of technology transfer on electroslag refining (ESR) of premium quality steels for ordnance, is reviewed in detail. Investigations used a small experimental laboratory ESR unit, and a large commercial unit manufactured by Consarc. Melting temperatures of some multi-component local slags were found to be significantly higher than reported nominal values. It was found that variations in slag composition during remelting could be assessed visually. Deoxidation practice, especially the type of deoxidant, had a greater influence than slag composition on levels of residual silicon and aluminum and on cleanliness of the final ingot steel. Silica-rich slags gave unsatisfactory ingot surfaces with higher melting point steels, while increasing slag calcium levels or introducing rare earth elements improved the modification of inclusions. Forced dry air circulation above the slag layer greatly enhanced sulphur removal from the steel. Mechanical properties, including tensile, notched impact, fracture toughness and fatigue, of as-cast ESR steel compared favourably with transverse values in forged electric furnace steel. GRA

N85-17115# Electrochemical Technology Corp., Seattle, Wash.
APPLICATION OF ELECTROCHEMICAL ENGINEERING METHODS AND THEORY TO SOLVING CORROSION AND ADHESION PROBLEMS WITH ORGANIC COATINGS Interim Summary Report, 24 Apr. 1982 - 30 Apr. 1984
R. T. Ruggeri and T. R. Beck Apr. 1984 112 p
(Contract N62269-82-C-0261)
(AD-A147799; NADC-84107-60) Avail: NTIS HC A06/MF A01 CSCL 11/6

The general objective of this work is to develop quantitative models for correlation and prediction of corrosion of aluminum under paint films. Transport properties for water and sodium and chloride ions were determined for five paints used on Navy aircraft as a basis for the models. Generic models for typical corrosion situations under paint films were developed. Author (GRA)

N85-17116# Naval Research Lab., Washington, D. C.
MECHANICAL PROPERTIES AND MICROSTRUCTURE OF CENTRIFUGALLY CAST ALLOY 718 Final Report, Oct. 1982 - May 1984
D. J. Michel and H. H. Smith 14 Nov. 1984 31 p
(AD-A147800; AD-F300501; NRL-MR-5431) Avail: NTIS HC A03/MF A01 CSCL 11/6

The relationship between the microstructure and mechanical properties of alloy 718 was investigated for two discs centrifugally cast at 50 and 200 rpm and given a duplex age heat treatment. The results of mechanical property tests at temperatures from 426 to 649 deg C showed that the tensile yield and ultimate strength levels of both castings were similar. However, the creep/rupture properties were considerably enhanced for the casting produced at 200 rpm. Comparison of the radial and transverse creep properties of each disc indicated that creep life was generally independent of orientation, but ductility was greatest for specimens oriented transverse to the radial direction of the casting. Fatigue crack propagation performance was not greatly influenced by orientation or mold speed parameters and was comparable to wrought Alloy 718 when compared on the basis of stress intensity factor range. The centrifugal casting process was found to produce a homogeneous microstructure free of porosity but with the expected segregation of solute alloying elements to Laves and carbide phases. The effect of the as-cast microstructure on the mechanical behavior and the potential influence of hot isostatic pressing to improve the microstructure are discussed. Author (GRA)

N85-17117# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Metallurgical Engineering and Materials Science.
THE FUNDAMENTALS OF DISLOCATION TRANSPORT OF HYDROGEN IN bcc IRON Ph.D. Thesis
C. Hwang and I. M. Bernstein Oct. 1984 181 p
(Contract N00014-75-C-0265)
(AD-A148143; TR-18) Avail: NTIS HC A09/MF A01 CSCL 11/6

The detailed characteristics of hydrogen transport by mobile dislocations during plastic deformation in bcc single crystal and polycrystal pure iron has been studied. Single crystals with a proper combination of surface orientation and tensile axis were used to separately study the hydrogen transport rates by screw, edge and mixed dislocations. This study was carried out experimentally through the use of a pair of sophisticated electrochemical cells incorporated with a specially constructed slow strain rate tensile testing device. The experimental uncertainties involved in the measurement of hydrogen flux have also been carefully analyzed and reduced to a minimum, so that the data obtained were able to be accurately interpreted. It was found that qualitatively the hydrogen flux transported by dislocations intimately reflects the dislocation egression on the monitored crystal surface. A competition between hydrogen transport by mobile dislocations and the trapping effect by newly generated sessile dislocations was studied, primarily by using polycrystal iron specimens. Dislocation structures formed with and without the presence of dislocation transported hydrogen in single crystals were also examined by transmission electron microscopy. GRA

N85-17118# Utah Univ., Salt Lake City. Dept. of Bioengineering.
FLUCTUATION PHENOMENA STUDIES IN CHEMICALLY SENSITIVE FIELD EFFECT TRANSISTOR. PART 1: CORROSION OF ALUMINUM Interim Technical Report
Zheng Kang Li, Johannes M. Reijn, and Jiri Janata 20 Nov. 1984 29 p
(Contract N00014-81-K-0664)
(AD-A148240; TR-4) Avail: NTIS HC A03/MF A01 CSCL 11/6

It is shown that chemically sensitive field effect transistors can be used to study stochastic processes at the solution/solid interface which is not at equilibrium. Auto spectral densities and coherence functions for corrosion of aluminum-silicon alloy at zero-net current conditions have been obtained. GRA

N85-17119# Illinois Univ., Urbana. Dept. of Metallurgy and Mining Engineering.
HYDROGEN EMBRITTLEMENT OF NICKEL
D. Lassila and H. K. Birnbaum Oct. 1984 128 p
(Contract N00014-83-K-0468)
(AD-A148322) Avail: NTIS HC A07/MF A01 CSCL 11/6

Experiments were performed to determine the effects of hydrogen segregation at grain boundaries on intergranular fracture of charged nickel deformed in tension. Two modes of hydrogen segregation are investigated; lattice diffusion and dislocation transport of Cottrell atmospheres of hydrogen. The effect of cosegregation of hydrogen and sulfur is also explored. The results of this study show that the parameters affecting the diffusive segregation of hydrogen to grain boundaries play a fundamental

role in conditions which result in embrittlement. If a sufficient quantity of hydrogen at grain boundaries is attained, the fracture mode of nickel will change from ductile rupture to intergranular. Experiments performed to evaluate the role of dislocation transport of hydrogen in the embrittlement of nickel suggest that dislocation transport has no effect on embrittlement and that the embrittlement mechanism is not dependent on hydrogen mobility. An analysis of the thermodynamics and kinetics of hydrogen segregation yielded values for the binding enthalpy of hydrogen to nickel grain boundaries and the breadth of hydrogen enhancement at boundaries. By considering these values and other test results a mechanism of hydrogen embrittlement of nickel is proposed. Three series of nickel tensile specimens were tested with various amounts of sulfur segregation present at grain boundaries. Segregation on the order of 0.1 monolayer has been shown to severely increase the embrittlement susceptibility of hydrogen charged nickel.

Author (GRA)

N85-17120# Illinois Univ., Urbana. Dept. of Metallurgy and Mining Engineering.

RAPID SOLIDIFICATION PROCESSING AND POWDER METALLURGY OF Al ALLOYS Annual Report, 15 Apr. 1983 - 14 Apr. 1984

H. L. Fraser 29 Oct. 1984 125 p

(Grant AF-AFOSR-0186-82)

(AD-A148427; AFOSR-84-1018TR; AR-2) Avail: NTIS HC A06/MF A01 CSCL 11/6

During the second year of the program, areas of emphasis were: (1) the development of a model to describe the mechanism of formation of rapidly solidified Al alloys (i.e., zones A and B); (2) the processing of particulate whose microstructure consists entirely of zone A; (3) the microstructures of rapidly solidified particulate of alloys based on Al-8Fe; (4) the identification of metastable phases which form in some of the Al alloys studied; and (5) dynamic compaction of particulate. A simple model for the formation of rapidly solidified hyper-eutectic Al alloys was developed. This model is based on the degree of undercooling achieved prior to nucleation and the extent to which recalescence effects may be inhibited by a rapid rate of heat-extraction. Zone A microstructures form when the temperature is lowered to below that of the extended alpha-Al liquidus where primary Al may be nucleated. The microstructures of rapidly solidified Al-Ni and Al-Co alloys may be interpreted satisfactorily by this model. B.G.

N85-17121# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MATERIALS OF THE FOURTH SCIENTIFIC-TECHNICAL CONFERENCE ON QUESTIONS OF THE EXTRUSION OF METALS (SELECTED ARTICLES)

G. I. Taranenko, Y. V. Manegin, G. G. Rutman, G. Y. Gun, P. I. Polukin, R. P. Isakov, A. V. Korobkov, A. N. Smirnov, Y. M. Krasheninnikov, V. P. Shavarin et al 26 Oct. 1984 42 p Transl. into ENGLISH from mono. "Materialy Chetvertogo Nauchno-Teknicheskogo Soveshchaniya po Voprosam Pressovaniya Metallov" Moscow, 1970 p 36-42, 100-103, 202-207, 214-218

(AD-A148578; FTD-ID(RS)T-0487-84) Avail: NTIS HC A03/MF A01 CSCL 11/6

As a result of nonuniformity of flow during extrusion/pressing in peripheral layers of metal being deformed at output from deformation area appears tensile stresses. During the extrusion/pressing of low plasticity materials as the hard to deform heat resistant nickel base alloys, tensile stresses lead to the destruction of molded article. Therefore, during the selection of the technological parameters of the extrusion/pressing similar materials it is necessary to attempt to accomplish deformation in such a way that the value of tensile stresses would be minimum. The following conclusions are drawn: for reducing/descending value of tensile stresses extrusion/pressing wrought alloys must be carried out with the least possible speed and the rate of extrusion/pressing should lower with an increase in degree of deformation. Author

N85-17122# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Metallurgical Engineering and Materials Science.

EFFECT OF MICROSTRUCTURE AND TRAPPING ON THE HYDROGEN EMBRITTLEMENT SUSCEPTIBILITY OF A TI-BEARING HSLA STEEL

M. Stevens and I. M. Bernstein Nov. 1984 187 p

(Contract N00014-75-C-0265)

(AD-A148610; TR-19; CMU-036-099-19) Avail: NTIS HC A09/MF A01 CSCL 11/6

The general hydrogen embrittlement susceptibility of a titanium-bearing HSLA steel has been characterized and correlated with detailed transmission electron and field ion microscopic studies of various microstructures. The hydrogen permeability and trapping in the same microstructures has also been studied through the use of electrochemical polarization and potentiostatic detection. The trapping character of the various microstructures has been determined by comparison with the TEM and FIM results. Hydrogen embrittlement susceptibility has been determined by the use of cathodically precharged cylindrical tensile specimens and hydrogen induced cracking of double cantilever beam type fracture mechanics specimens. The hydrogen permeability studies showed that austenitized and quenched microstructures were composed of essentially low interaction energy reversible trap sites for hydrogen including but not restricted to grain boundaries, solute elements and dislocations. Aging at temperatures between 400 deg C and 500 deg C still resulted in a reversible trap population, although the character of trapping was inferred to have shifted to higher capture-to-release rates from examination of the form of the transient hydrogen exit flux. The introduction of cementite in these microstructures was assumed to be responsible. At aging temperatures of 600 deg C and higher, irreversible trapping of hydrogen was found to occur concurrently with the direct precipitation of the alloy carbide, TiC. GRA

N85-17123# Michigan Technological Univ., Houghton. Dept. of Metallurgical Engineering.

THE INFLUENCE OF STRAIN RATE AND POROSITY ON THE DEFORMATION AND FRACTURE OF TITANIUM AND NICKEL

P. E. Magnusen, P. S. Follansbee, and D. A. Koss Jul. 1984 32 p Prepared in cooperation with LASL

(Contract N00014-76-C-0037)

(AD-A148670; TR-25) Avail: NTIS HC A03/MF A01 CSCL 11/6

The influence of strain rate on the tensile deformation and fracture behavior of powder fabricated titanium and nickel containing porosity has been investigated. Measurements of the uniform strain, local fracture strains, and elongations to failure show that, over the range of strain rates from 0.0001 to 100 per 1/sec, there is little or no effect of the strain rate on the fracture behavior of these materials at any of the porosity levels studied. In contrast, increasing porosity causes significant decreases in the yield stress, strain hardening exponent, and ductility; these effects are more pronounced in the titanium than in the nickel. The porosity induced loss of ductility can be understood in terms of the combined effects of enhanced geometric softening and shear localization due to a network of imperfections introduced into the materials by the presence of porosity. Secondary effects due to hydrogen embrittlement and thermal gradients forming during deformation are also noted. GRA

N85-17124# Michigan Technological Univ., Houghton. Dept. of Metallurgical Engineering.

THE INFLUENCE OF POROSITY ON THE DEFORMATION AND FRACTURE OF ALLOYS

R. J. Bourcier, D. A. Koss, R. E. Smelser, and O. Richmond Nov. 1984 36 p

(Contract N00014-76-C-0037)

(AD-A148766; AD-E301534; TR-26) Avail: NTIS HC A03/MF A01 CSCL 11/6

The tensile deformation and fracture behavior of alloys containing rounded porosity and with differing levels of matrix strain hardening has been examined both experimentally and analytically. The stress-strain response in uniaxial tension and, to a limited extent, plane-strain tension has been determined at room temperature for powder-fabricated titanium, and Titanium-6 Aluminum-4

Vanadium containing porosity. The strength and the ductility of both alloys decrease substantially with increasing porosity level. A large strain elastoplastic finite element model based on a regular array of equal-sized spherical voids is used to predict bulk porosity effects; the analysis is in good agreement with the experimentally observed rates of void growth, but it underestimates the degradation of strength with increasing porosity. In an analysis unique to P/M alloys, the effects of porosity on a local scale are examined successfully by a continuum imperfection model which predicts the fracture of porous materials with differing matrix strain-hardening characteristics. The analysis is significant in that it implies that a primary effect of porosity on fracture is to introduce into the material a network of planes of high local pore content (imperfections). GRA

N85-17125# Stanford Univ., Calif. Synchrotron Radiation Lab.
STRUCTURAL STUDIES OF AMORPHOUS Mo-Ge ALLOYS USING SYNCHROTRON RADIATION Ph.D. Thesis
Jeffrey Barrett Kortright Jun. 1984 249 p refs
(Contract DE-AM03-76SF-00115)
(DE85-002061; DOE/SF-00115/T11; SU-SSRL-84/05) Avail: NTIS HC A11/MF A01

Structural changes in sputtered amorphous Mo-Ge alloy films with composition varying from a-Ge to about 70 at. % Mo were studied with several X-ray techniques. Results of individual techniques are presented. The complementary nature of information obtained from EXAFS and scattering for these materials is discussed and the results and structural changes with composition are summarized. DOE

N85-17126# Centro Informazioni Studi Esperienze, Milan (Italy). Publications Office.
ON-LINE MONITORING OF THE TRUE CORROSION RATE IN PROBLEMS RELATED TO POWER PLANTS
R. Rizzi and C. Ronchetti 1984 30 p refs Presented at Symp. on Nondestructive Testing and Electrochem. Methods of Monitoring Corrosion in Ind. Plants, Montreal, 22-24 May 1984
(CISE-2335) Avail: NTIS HC A03/MF A01

Tubular electrode probes for the measurement of the true corrosion rate in industrial power plants were constructed. The monitoring of steam condensers and of different circuits in thermal plants over several years shows good reliability and usefulness. Use of the probes in hard working conditions, and experimental results on pilot loops indicate the validity of such probes as a tool for wider corrosion rate monitoring of structural materials in different operating conditions. Author (ESA)

N85-17127# Centro Informazioni Studi Esperienze, Milan (Italy). Publications Office.
STATIC AND DYNAMIC FRACTURE TOUGHNESS CHARACTERIZATION OF SA508 FORGING AND SA533B WELDED PLATE
F. Barbesino, C. Fossati, and S. Ragazzoni 1984 46 p refs Presented at 5th Intern. Conf. on Pressure Vessels Technol., San Francisco, 9-14 Sep. 1984 Sponsored by Ente Nazionale per l'Energia Electricca/CRTN
(CISE-2258) Avail: NTIS HC A03/MF A01

Static and dynamic fracture toughness data were generated for SA508 Cl2 and SA533 GrB Cl1 RPV steels and a submerged arc weld in SA533 B over the temperature range minus 96 to 300 C. Toughness transition curves are compared. Static tests were carried out on 1/2 in. and 1 in. thick CY specimens and dynamics tests on PCCV specimens. Lower shelf levels are found to be the same independent of material, orientation and loading rate. Upper shelf levels and transition regions strongly depend on heat to heat variation, specimen orientation and loading rate. Dynamic transition curves always occur at higher temperatures than static ones, while upper shelf dynamic levels are lower or higher than static depending on material and/or orientation. Weld metal static transition is 70 C higher than base material.
Author (ESA)

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N85-17128 National Physical Lab., Teddington (England). Div. of Materials Applications.
REVIEW OF THE MECHANICAL PROPERTIES OF SMC AND GRP MATERIALS
A. F. Johnson Sep. 1984 19 p refs
(NPL-DMA(A)88; ISSN-0143-7313) Copyright. Avail: Issuing Activity

The mechanical properties of sheet molding compounds and glass reinforced plastics produced by traditional hand lay-up methods are reviewed. Short term mechanical properties such as modulus and strength; the variability in these properties due to the different fabrication methods; and the effect of environment on these properties are considered. Author (ESA)

N85-17129*# National Aeronautics and Space Administration, Washington, D. C.
CERAMIC FABRICATION PROCESS BEFORE FIRING-SURFACE TREATMENT OF CERAMIC POWDER
Teruo Tsunoda May 1984 23 p refs Transl. into ENGLISH from Ceram. (Japan), v. 18, no. 2, 1983 p 152-160 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77437; NAS 1.15:77437) Avail: NTIS HC A02/MF A01 CSCL 11B

The surface treatment of powders is discussed. Stability of ceramic powders and surfaces and the improvement of moldability are addressed. Characteristics of surface treatment technology are given, including formation of inorganic surface-treated layers, liquid phase reactions, gas treatment, surface treatment by coupling agents, and the formation of results of surface treatment. Author

N85-17130# Royal Aircraft Establishment, Farnborough (England).
POLYMER ELECTROLYTES: AN INVESTIGATION OF SOME POLY (N-PROPYLAZIRIDINE)/LITHIUM SALT COMPOSITIONS
K. R. Baldwin, A. J. Golder, and J. Knight 9 Apr. 1984 26 p refs
(RAE-TR-84036; RAE-Mater-Struct-81; BR93282) Avail: NTIS HC A03/MF A01

Poly (N-propylaziridine)/lithium salt compositions were synthesized and their electrical conductivities were measured to assess their suitability as electrolytes in safe, leakproof, high energy-density lithium batteries operating at ambient temperature. The effects on conductivity of temperature, and the nature and concentration of the salt were studied. The salts markedly improve conductivity of the compositions over that of the undoped polymer but they are insufficiently conducting to be considered as battery electrolytes, due possibly to ion pairing. Their creep resistance is also low. Less fluid compositions containing higher molecular weight polymers better able to promote ion separation are more suitable.
Author (ESA)

N85-17131# Virginia Univ., Charlottesville. Polymer Materials and Interfaces Lab.
ELASTOMERS AND OTHER ORGANIC COMPOSITES Final Report, 30 Sep. 1980 - 29 Jun. 1984
J. E. McGrath, G. L. Wilkes, T. C. Ward, D. G. Baird, and D. W. Dwight 25 Oct. 1984 11 p
(Contract DAAG29-80-K-0093)
(AD-A147624; ARO-17617.33-CH) Avail: NTIS HC A02/MF A01 CSCL 11/10

The objective of this program was to bring together five investigators whose expertise was in the area of polymer synthesis, characterization, rheology and processing, solid state morphology and mechanical behavior and surface science. This abstract will describe some highlights of research findings and potential applications. In addition, in an appendix we have included statistics on publications, preprints and theses. GRA

N85-17132# Defence Research Establishment, Ottawa. (Ontario).
MEASUREMENT OF STRESS IN CLOTHING: A LITERATURE REVIEW AND METHODS SELECTED
R. M. Crow and M. M. Dewar Jul. 1984 30 p
(AD-A147674; DREO-TN-84-10) Avail: NTIS HC A03/MF A01 CSCL 15/5

In a DCGEM sponsored task to determine if alternative seam types could replace the commonly used double lap seams in Canadian Forces (CF) clothing, the question was raised as to how strong seams have to be in clothing. In a 1952 study, Frederick at Natick, had stated that the seam strength, for the end uses he was considering should be 80% of the fabric strength. The recommendation arising from a DCGEM sponsored task was that the criteria of 80% seam efficiency be revalidated because of the progress made in technology since Frederick's work, resulting in stronger, more durable sewing threads, seams and fabrics. This study was undertaken to find a technique to determine where maximum stresses in clothing, and thus, in seams, occur; to find a reliable method to measure these maximum stresses; and to determine the maximum stresses which would occur in the seams of various CF garments which presently have double lap seams. This paper reviews the literature for methods to determine where stresses occur in clothing, what stances cause maximum stress and how to measure these stresses. It describes various approaches tried and final selection of methods used to both qualitatively and quantitatively measure stress in clothing. GRA

N85-17133# Army Construction Engineering Research Lab., Champaign, Ill.
FIELD TEST RESULTS OF EXPERIMENTAL EPDM (ETHYLENE PROPYLENE DIENE MONOMER) AND PUF (POLYURETHANE FOAM) ROOFING Final Report
M. J. Rosenfield Sep. 1984 77 p
(DA Proj. 4A7-62731-AT-41)
(AD-A147697; CERL-TR-M-357) Avail: NTIS HC A05/MF A01 CSCL 13/13

This report presents the results of 2 years of study of ethylene propylene diene monomer (EPDM) and sprayed-in-place polyurethane foam (PUF) roofs following their installation. Initial samples taken from the materials delivered were tested to establish initial characteristics. Further samples were cut from the roofs every 6 months for 2 years to determine what changes were occurring from natural aging. Thermocouples and strain gages were also used to study response of the roof systems to changes in ambient conditions. The EPDM showed an increase in mechanical properties during the first 6 to 12 months, probably due to completion of the curing process, followed by no significant change in properties for the rest of the test period. There was little consistency to the results of PUF during the same time of exposure. This could happen for several reasons: differences among PUF products used, application techniques, and inconsistent atmospheric conditions during application. Test results indicated that both EPDM and PUF, when properly installed, will perform satisfactorily. GRA

N85-17134# Cincinnati Univ., Ohio. Dept. of Materials Science and Metallurgical Engineering.
PHASE DIAGRAM OF POLYMER BLENDS CONTAINING BLOCK COPOLYMERS
R. J. Roe 5 Nov. 1984 32 p
(Contract N00014-77-C-0376)
(AD-A147706; TR-11) Avail: NTIS HC A03/MF A01 CSCL 11/9

The phase transition and phase separation behavior occurring in mixtures containing an A-B block copolymer and an A homopolymer is discussed. With a pure block copolymer an order-disorder transition can be induced by raising the temperature, whereby the ordered lattice of segregated microdomains becomes unstable and gives way to a homogeneous liquid structure. Small amounts of a homopolymer added to a block copolymer can be accommodated in the microdomains consisting of the same type of monomeric units, up to a solubility limit that depends on the relative length of the homopolymer and the compolymer block and on the temperature. The order-disorder transition temperature of the block copolymer is also affected by the added homopolymer. At the other extreme of concentration, spherical micelles of block compolymer is formed when a small amount of the copolymer is formed when a small amount of the compolymer is added in the bulk homopolymer, and its critical micelle concentration again depends on the relative length of the molecules and block involved and on the temperature. Measurements were made with light scattering and small-angle X-ray scattering techniques to determine the phase behavior of mixtures containing a styrene-butadiene block copolymer and either a polystyrene or a polybutadiene. GRA

N85-17135# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
EFFECT OF INTERCONNECTION OF THE ENDS OF A SLIDING BEARING ON FILM THICKNESS Final Report
R. S. Montgomery Sep. 1984 25 p
(AD-A147736; ARLCB-TR-84032) Avail: NTIS HC A02/MF A01 CSCL 11/8

The effect of the area of interconnection between the ends of fast-acting bearings such as those of recoil mechanisms used with American tank guns was studied with an apparatus which simulated a concentric recoil system. It was studied with an apparatus which simulated a concentric recoil system. It was found that these bearings do not starve with a small interconnection area, but a larger area would probably produce a faster-acting bearing. It would also result in a thinner fluid film but this would probably be unimportant. The film thickness continues to increase for a time even after the movement of the recoiling tube has stopped, so there appears little chance that the film would entirely collapse before counter-recoil begins. There are two area ratios that result in thinner film thicknesses and slower formation of the fluid film. These area ratios should be avoided. Their locations were at 1.5 and 4.9 sq. mm but they might be at different locations with the larger actual recoil bearings and with the geometries of specific designs. GRA

N85-17136# Tennessee Univ., Knoxville.
ELECTROCHEMISTRY OF POLYMER FILMS. APPLICATIONS TO CHEMICAL ANALYSIS AND ENERGY CONVERSION Final Report, 26 Jan. 1981 - 25 Jul. 1984
J. Q. Chambers 17 Oct. 1984 6 p
(Contract DAAG29-81-K-0036)
(AD-A147737; ARO-17715.11-CH) Avail: NTIS HC A02/MF A01 CSCL 07/4

Electroactive polymers containing the widely studied electron acceptor, tetracyanoquinodimethane or TCNQ, in the polymer backbone have been synthesized. The charge transport processes through thin films of these TCNQ polymers and related materials have been thoroughly studied leading to new insight at the molecular level. Chemical reactions coupled to the electron hopping steps can profoundly influence the rate of charge transport in fixed site polymer films. Methodology and techniques have been developed and refined for the study of polymer film modified electrodes. Author (GRA)

N85-17137# Princeton Univ., N. J. Dept. of Chemical Engineering.
RUBBER-MODIFIED EPOXIES. PART 2: MORPHOLOGY, TRANSITIONS, AND MECHANICAL PROPERTIES Technical Report, Apr. - Oct. 1984
L. C. Chan, J. K. Gillham, A. J. Kinloch, and S. J. Shaw Nov. 1984 49 p 2 Vol.
(Contract N00014-84-K-0021)
(AD-A147962) Avail: NTIS HC A03/MF A01 CSCL 11/10

The mechanical properties of two fully cured rubber-modified epoxy systems, each with varying morphologies and maximum glass transition temperatures developed from different cure conditions, have been investigated versus temperature (-90 to 140 C) using the neat system (glass transition temperature = 167 C) as control. The mechanical properties of the amino-terminated rubber-modified system were more sensitive to cure history than those of the prereacted carboxyl-terminated rubber-

modified system. The improvement of fracture energy (G sub IC) at a low strain rate for a rubber-modified epoxy system depends on both the volume fraction of the dispersed phase and the inherent ductility of the matrix, the latter being related to glass transition temperature. GRA

N85-17138# Massachusetts Univ., Amherst. Dept. of Polymer Science and Engineering.
STRUCTURE-PROPERTY RELATIONSHIPS IN THERMOPLASTIC ELASTOMERS. PART 1: SEGMENTED POLYETHER-POLYURETHANES
Edward J. Woo, G. Farber, Richard Farris, C. Peter Lillya, and James C. W. Chien 26 Oct. 1984 35 p
(Contract N00014-83-K-0083; NR Proj. 659-795)
(AD-A148043; AD-E850735; TR-4) Avail: NTIS HC A03/MF A01 CSCL 11/9

Segmented poly(ether-b-urethanes) have been synthesized with 2000 MW polypropylene oxide coupled with diisocyanates and diol type chain extenders. The diisocyanates used were symmetric rigid 4,4'-diphenylmethane diisocyanate (MDI), linear aliphatic hexamethylene diisocyanate (HDI) and unsymmetric rigid toluene-2,4-diisccyanate (TDI). The chain extenders were symmetric N,N'-bis(2-hydroxyethyl) terephthalamide (BT) and N,N'-bis (2-hydroxyethyl)-hydroquinone (BH) unsymmetric N,N'-bis(2-hydroxyethyl)isophthalamide, and linear aliphatic butanediol. Hard segment contents ranged from 20 to 40 wt %. The thermal behavior of these materials is consistent with phase separation into separate hard and soft domains. GRA

N85-17139# Martin Marietta Labs., Baltimore, Md.
MECHANICAL PROPERTIES OF ADHESIVELY BONDED ALUMINUM STRUCTURES PROTECTED WITH HYDRATION INHIBITORS Annual Report
G. D. Davis, J. S. Hearn, L. J. Matienzo, and J. D. Venables Nov. 1984 58 p
(Contract N00014-80-C-0718)
(AD-A148123; MML-TR-84-54(C); AR-4) Avail: NTIS HC A04/MF A01 CSCL 11/1

The use of several amino phosphonic acids as hydration inhibitors to improve the properties of adhesively bonded aluminum structures has been investigated using T-peel, double-lap-shear, and wedge tests. Each of the inhibitors tested was found to be compatible with epoxy adhesives in a dry environment. Most were also compatible in a hot, humid environment. Examination of both sides of the propagated crack in wedge test specimens treated with nitrilotris methylene phosphonic acid (NTMP) showed that hydration of the oxide could be slowed sufficiently so that crack propagation occurred prior to it. In this case, the weakest link was the coupling of the inhibitor to the adhesive. Inhibitors designed to strengthen this coupling have been synthesized and are currently being tested. GRA

N85-17140# Manlabs, Inc., Cambridge, Mass.
APPLICATION OF COMPUTER METHODS FOR CALCULATION OF MULTICOMPONENT PHASE DIAGRAMS OF HIGH TEMPERATURE STRUCTURAL CERAMICS Technical Report, 1 Aug. - 30 Sep. 1984
L. Kaufman 23 Oct. 1984 17 p
(Contract F49620-84-C-0078)
(AD-A148138; AFOSR-84-0972TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

Computer Coupled Phase Diagram and Thermochemical Data have been used to calculate the NiO-SiO2 and Cr2O3-SiO2 Phase Diagrams and isothermal sections in the Ni-Si-Al and Ni-Cr-Si systems between 700K and 1500K. GRA

N85-17141# Massachusetts Univ., Amherst. Dept. of Polymer Science and Engineering.
STUDY OF REACTION KINETICS AND DEVELOPMENT OF ELASTIC PROPERTIES IN NETWORK POLYMERIZATION SYSTEMS BY THE IMPULSE TECHNIQUE
J. C. W. Chien 26 Oct. 1984 25 p
(Contract N00014-83-K-0083)
(AD-A148187; TR-7) Avail: NTIS HC A02/MF A01 CSCL 07/3

The total impulse approach to linear viscoelasticity developed by Farris has been extended to the study of kinetics of network formation and development of mechanical properties in nonlinear polymerization reactions. A single experiment permits kinetic data and absolute measurements of viscosity and elastic parameters to be obtained during the elevation of a reacting system from a liquid to a glassy or rubber network. The method was applied to the cure of an epoxy-amine system at different temperatures to obtain kinetic information (gel times), viscosities and elastic parameters. Theoretical predictions of pre-gel and post-gel relations are in good agreement with the observed experimental values. Author (GRA)

N85-17142# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
SYNTHESIS AND CHARACTERIZATION OF A 1,4 POLYBUTADIENE/ISOTACTIC POLYPROPYLENE BLOCK COPOLYMER
M. A. Drzewinski and R. E. Cohen 19 Nov. 1984 9 p
(Contract N00014-77-C-0311)
(AD-A148199; TR-14) Avail: NTIS HC A02/MF A01 CSCL 11/9

Based on the nature of the anionic-to-Ziegler Natta transformation reaction employed, the subsequent fractionation and the characterization of the product, and particularly the transmission electron microscopy of the morphology of the polymer produced, it is concluded that a 1,4 polybutadiene/isotactic polypropylene diblock copolymer has been produced. Certain properties and potential uses of this copolymer are discussed in this preliminary report. Author (GRA)

N85-17143# Atlanta Univ., Ga. Polymer Research Center.
THE SYNTHESIS AND CHARACTERIZATION OF POLY(OXY(2-METHYL-1,3-PHENYLENE) OXYISOPHTHALOYL-b-(2-METHYL-1,3 -PHENYLENE) OXYTEREPHTHALOYL)OXY
Malcolm B. Polk and Fedelis C. Onwumere 19 Nov. 1984 18 p
(Contract N00014-84-K-0404)
(AD-A148269; TR-1) Avail: NTIS HC A02/MF A01 CSCL 07/3

The syntheses and characterizations of poly(oxy(2-methyl-1,3-phenylene) -oxyisophthaloyl-b-oxy(2-methyl -1,3-phenylene) oxyterephthaloyl) and the corresponding homopolymers are described. The synthesis involved the coupling of dihydroxy-terminated homopolymers with terephthaloyl chloride. The resulting block copolyester was characterized by infrared spectroscopy, proton and carbon-13 nuclear magnetic resonance spectroscopy, solution viscosity, differential scanning calorimetry, and thermogravimetric analysis. Author (GRA)

N85-17144# Army Materials and Mechanics Research Center, Watertown, Mass.
CHARACTERIZATION AND SELECTION OF POLYMER MATERIALS FOR BINARY MUNITIONS STORAGE. PART 2: CHARACTERIZATION OF LLDPE RESINS Final Report
C. R. Desper Jul. 1984 44 p
(DA Proj. 1L1-62622-A-554)
(AD-A148324; AMMRC-TR-84-28-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 19/1

This work is aimed at determining the materials properties required for storage of DF (methylphosphonic difluoride) over extended periods of time at temperatures as high as 70 C. Earlier studies showed the most likely mode of failure to be environmental stress cracking of the polyolefin container, rather than chemical or oxidative attack. The most promising candidates in terms of resistance to environmental stress cracking are ethylene copolymers with a small alpha-olefin comonomer content. The comonomer, typically butene-1 or hexene-1, introduces short side chain branches which disrupt the regularity of the crystal morphology, presumably leading to a greater proportion of intercrystalline ties. An X-ray diffraction method was developed for measuring the amount of short chain branching which offers greater accuracy than the previous infrared absorption method. Characterization of short chain branching by such a method, along with molecular weight characterization by gel permeation chromatography and

crystallinity determination by density, were deemed essential to quality control of resins for the intended application. GRA

N85-17145# Cincinnati Univ., Ohio. Dept. of Materials Science and Metallurgical Engineering.
DEUTERIUM ISOTOPE EFFECT ON THE COMPATIBILITY BETWEEN POLYSTYRENE AND POLYBUTADIENE
J. L. Lin, D. Rigby, and R. J. Roe 20 Nov. 1984 16 p
(Contract N00014-77-C-0376)
(AD-A148551; TR-12) Avail: NTIS HC A02/MF A01 CSCL 11/9

We studied the effect of deuteration of polystyrene on the miscibility behavior of polystyrene-polybutadiene blend systems. We prepared a polystyrene having its aromatic hydrogens replaced by deuterium by starting from an ordinary polystyrene and treating it with deuterated benzene in the presence of an organometallic catalyst. We also prepared, as a control, a hydrogeneous polystyrene of closely similar structure by repeating the same procedure except that this time ordinary, rather than deuterated, benzene was used. These matching pairs of hydrogeneous and deuterous polystyrenes, when mixed with a polybutadiene or a styrene-butadiene random copolymer, were shown to give practically identical cloud point curves, thus indicating that the deuterium isotope effect is negligible. Author (GRA)

N85-17146# Wisconsin Univ., Madison. Dept. of Chemical Engineering.
PROPERTIES OF ULTRA-VIOLET CURED POLY (DIMETHYLSILOXANE)-UREA ACRYLATES Interim Technical Report
X. Yu, M. R. Nagarajan, C. Li, T. A. Speckhard, and S. L. Cooper Nov. 1984 46 p
(Contract N00014-83-K-0423)
(AD-A148570; TR-6) Avail: NTIS HC A03/MF A01 CSCL 11/9

A series of poly(dimethylsiloxane)-urea acrylate prepolymers was synthesized by reacting aminopropyl terminated poly (dimethylsiloxane) (ATPS) with isocyanatoethyl methacrylate (IEM). The oligomers were cured using ultraviolet radiation in the presence of different reactive diluents. Three systems were prepared with varying ATPS soft segment molecular weight. All of the samples were transparent. However, microphase separation was indicated by the observation of two glass transition temperatures attributed to separate ATPS and IEM/reactive diluent phases. Increasing ATPS molecular weight led to a lower rubbery phase transition temperature and a smaller rigid phase volume fraction. These effects were reflected in lower modulus and tensile strength at room temperature, and higher elongation at break. An increase in Young's modulus and the ultimate tensile strength of these materials. Increasing reactive diluent content caused the rubbery phase transition peak to decrease in magnitude without changing its position and shifted the hard segment transition to higher temperature. The tensile strengths and moduli of these materials were higher than those reported in the literature for other poly(dimethylsiloxane) and urethane acrylate materials. GRA

N85-17147# Wisconsin Univ., Madison. Dept. of Chemical Engineering.
POLY(DIMETHYLSILOXANE)-POLYURETHANE ELASTOMERS: SYNTHESIS AND PROPERTIES OF SEGMENTED COPOLYMERS AND RELATED ZWITTERIONOMERS Interim Technical Report
Y. Xuehai, M. R. Nagarajan, T. G. Grasel, P. E. Gibson, and S. L. Cooper Nov. 1984 41 p
(Contract N00014-83-K-0423)
(AD-A148571) Avail: NTIS HC A03/MF A01 CSCL 11/10

A series of polyurethane block polymers based on hydroxybutyl-terminated poly(dimethylsiloxane) soft segments of molecular weight 2000 were synthesized. The hard segments consisted of 4,4'-methylenediphenylene diisocyanate (MDI) which was chain extended with either 1,4-butanediol (BD) or N-methyldiethanolamine (MDEA). The MDEA-extended materials were ionized using 1,3-propane sultone. The weight fraction of hard segments was in range 0.13-0.39. The morphology and properties of these polyurethane elastomers were studied by variety of techniques. All of these short segment block copolymers showed nearly complete phase separation. The zwitterionomer materials exhibited ionic aggregation with the hard domains. Hard segment crystallinity or ionic aggregation did not affect the morphology. Hard domain cohesion was found to be a more important factor than hard domain volume fraction in determining the tensile and viscoelastic properties of these elastomers. Author (GRA)

N85-17148# Geo-Centers, Inc., Newton, Mass.
MIST FLAMMABILITY STUDIES OF CANDIDATE FIRE-RESISTANT HYDRAULIC FLUIDS
S. G. Pande, J. B. Romans (Naval Research Lab., Washington), and R. C. Little (Naval Research Lab., Washington) Aug. 1984 32 p
(Contract N00014-83-C-2274)
(AD-A148572; GC-TR-84-421) Avail: NTIS HC A03/MF A01 CSCL 11/8

Using NRL's mist flammability test apparatus, several commercial samples of 40% water-in-oil emulsions (fire-resistant hydraulic fluids) were screened for fire resistancy. The term fire-resistancy relates to specific flammability test conditions. For comparison purposes, two other commercial fire-resistant hydraulic fluids were screened viz., a water-glycol solution and a phosphate ester. The Navy's currently used petroleum-type hydraulic fluid, 2190-TEP, was employed as the reference fluid. At the most severe conditions investigated (i.e., spray disk tangential velocity of 67.8 m/s, and fluid flow rate of 850 ml/min), none of the fire-resistant hydraulic fluids exhibited ignition leading to propagation in the presence of the propane test flame, indicating fire resistancy under these conditions. Under identical operating conditions, 2190-TEP exhibited gross ignition with propagation of flame ranging from 180 deg. to 360 deg. around the spinning disk, indicating it to be a potential fire hazard. The physical and chemical characteristics of the 40% water-in-oil emulsions suggest that this class of fire-resistant hydraulic fluids may be suitable replacement candidates for 2190-TEP. These promising results therefore warrant further study. GRA

N85-17149# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
THE KINETICS OF ELECTRON TRANSFER REACTIONS IN AND AT FILMS OF ELECTROACTIVE POLYMERS
C. R. Leidner, R. H. Schmehl, P. G. Pickup, and R. W. Murray 26 Oct. 1984 8 p
(Contract N00014-82-K-0337)
(AD-A148597; TR-9) Avail: NTIS HC A02/MF A01 CSCL 07/4

Films of polymers and copolymers of transition metal complexes can be prepared on electrodes by reduction of vinyl substituted monomers like Ru(bpy) (vpy) and Os(bpy) (4-py-NHCOCH-CHPh). Using several methods, we have studied the transport of electrons through the mixed valent oxidation state of the films, and the electrocatalytic oxidation and reduction of other electroactive substances contacting the film from the solution side. The interrelationship of the rate of these processes in electrocatalytic electrode design is also discussed. GRA

N85-17150# National Centre of Tribology, Risley (England). European Space Tribology Lab.
THE PERFORMANCE OF FOMBLIN Z25 OIL IN BALL BEARINGS OPERATING IN VACUUM Progress Report
Paris ESA Jul. 1983 49 p refs
(Contract ESA-4099/79)
(ESA-ESTL-056; ESA-CR(P)-1929) Avail: NTIS HC A03/MF A01

Fomblin Z25, a perfluoroalkylether lubricant with a very low vapor pressure, was tested in ball bearings operating in vacuum. A problem of polymerization with the Z25 oil, particularly in open conformity bearings, results from the formation of active steel surfaces created during ball/race interactions which react with the oxygen atom in the lubricant molecule. Chain scission occurs and a perfluoropolymer is created. Steel wear occurs on the races and balls and bearing torque noise increases. Thus Z25 cannot be recommended for use in extended duty satellite applications

although low duty/slow speed applications may be considered. Fomblin Y(H)VAC40/11 gives more effective lubrication. The torque noise remains low and no polymer is created. The refined mineral oils BP110 and Kendal KG80 also provide very effective lubrication with no wear and with low torque noise but the synthetic triester BP135 fails to give proper EHD lubrication and wear occurs.
Author (ESA)

N85-17151# Marburg Univ. (West Germany). Fachbereich Physik.
DENSITY OF STATES AND RECOMBINATION IN AMORPHOUS SILICON (a-Si:H) Final Report, Jun. 1983
Walther Fuhs and Helmut Mell Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 61 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-216; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 13

Hydrogenated amorphous silicon films were prepared by the decomposition of silicone in a capacitively coupled glow discharge system. The density of gap states N(E) in these films was studied by space charge spectroscopy. The N(E)-curves deduced from transient capacitance results show a maximum near midgap and deep minima near Ec-E=0.4eV and E-Ev=0.6eV. Recombination of photogenerated carriers was studied by measurements of steady state and transient photoconductivity, dual beam spectroscopy of photoconductivity, and spin-dependent photoconductivity. The results are discussed in a model in which the most important centers for recombination and trapping are Si dangling bonds. Exposure to light creates additional dangling bond defects produced by recombination. Author (ESA)

N85-17152# Rolls-Royce Ltd., Derby (England).
ROLLS-ROYCE EXPERIENCE WITH THERMAL BARRIER COATINGS
A. Bennett 1 Aug. 1984 7 p Presented at British Ceramic Soc. Basic Sci. Section Meeting, London, 10-21 Dec. 1983
(PNR-90222) Avail: NTIS HC A02/MF A01

Technical and economic justifications for the use of thermal barrier coatings in aero engines are outlined. Zirconia-based ceramic coating materials are reviewed. The use of metallic and cermet bonding coats is described, particularly oxidation related failure mechanisms. Diagnostic analyses to explain failure mechanisms related to the stresses and strains encountered in major engine cycles are presented. This approach is valuable in clarifying the failure mechanisms and directing research towards effective material and processing improvements. Author (ESA)

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N85-17153# SRI International Corp., Menlo Park, Calif.
ANALYSIS OF MIDDLE DISTILLATE FUELS BY HIGH RESOLUTION FIELD IONIZATION MASS SPECTROMETRY Annual Report, 1 Jun. 1982 - 31 Aug. 1984
R. Malhotra, M. J. Coggiola, S. E. Young, D. Tse, and S. E. Buttrill, Jr. 29 Oct. 1984 40 p
(Contract N00014-81-K-2032; F65-511)
(AD-A147724) Avail: NTIS HC A03/MF A01 CSCL 21/4

A method for the rapid and detailed chemical characterization of distillate fuels has been developed using high resolution field ionization mass spectrometric (HR-FIMS) techniques. A vintage AEI MS-9 mass spectrometer has been modified to house a volcano-style field ionizer and has been equipped with a high-temperature batch inlet system. Field ionization is particularly useful in this regard because it produces only molecular ions for most compounds and because different compound types do not differ in their ionization efficiencies by more than a factor of four. The mass spectrometer is operated at a resolution of 3000, which is adequate to resolve all the different types of hydrocarbons likely to be present in the fuel sample. Software has been written to present the mass spectrum intensities in a matrix where the various columns represent the different z-series of the hydrocarbons and the rows represent the number of carbon atoms in any given component. Analysis of a stable and an unstable jet fuel showed that the unstable fuel had a substantially higher naphthalene content. GRA

N85-17154# Army Armament Research and Development Command, Dover, N. J. Large Caliber Weapon Systems Lab.
CLOSED VESSEL COMBUSTION OF STICK PROPELLANT Final Technical Report, Jun. 1982 - Jun. 1983
D. Chiu, A. Grabowsky, and D. Downs Oct. 1984 28 p
(AD-A147802; AD-E401247; ARLCD-TR-84015) Avail: NTIS HC A03/MF A01 CSCL 19/1

Combustion of slotted single-perforated stick, triple base, M31-type propellant was studied in a closed vessel environment. The primary objective of these studies was to provide information for the characterization of stick propellants. Burning rates were determined as a function of propellant stick lengths, igniter configurations, and closed bombs with different length-to-diameter ratios. Low pressure burning rates were obtained from strand burner tests to eliminate possible variability in the extrapolation from the burning rate curve obtained from closed bombs. Studies of changes in the effective burning surface area of the propellant were performed in terms of vivacity. Orientation of the propellant sticks appeared to change the initial vivacity values and thereby, the effective burning surface area. With random orientation of the propellant sticks, burning rates obtained were higher than those obtained from the stacked orientation. This may be due to change in the ignition gas flow patterns over the propellant bed. GRA

N85-17155# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.
GC-FTIR (FOURIER TRANSFORM INFRARED SPECTROMETRY) OF JET FUELS Final Report, 15 Jul. 1982 - 15 Aug. 1983
J. R. Cooper and L. T. Taylor Feb. 1984 156 p
(Contract F33615-82-C-2258)
(AD-A148272; AFWAL-TR-84-2007) Avail: NTIS HC A08/MF A01 CSCL 07/4

The successful interfacing and utilization of fused silica capability gas chromatography (GC) columns with Fourier transform infrared spectrometry (FTIR) can introduce difficulties not usually encountered with lower efficiency (higher capacity) GC columns. Recognition of these difficulties, however, can lead to refinement of a GC-FTIR detection system which can analyze complete samples with low nanogram detection limits. Chromatography and spectrometric considerations include lightpipe temperature, choice of same introduction, column concentration dynamic range capability, infrared data acquisition rate and spectral S/N ratio. These parameters as they relate to capability GC-FTIR method development are discussed. GC-FTIR identification limits for sixteen model compounds which represent both polar and non-polar functionalities have been established employing optimized chromatographic-spectrometric parameters for complex mixture analysis. GRA

N85-17156# Illinois Univ., Urbana. Dept. of Mechanical and Industrial Engineering.
ANALYSIS OF DEFLAGRATION TO DETONATION TRANSITION IN HIGH-ENERGY SOLID PROPELLANTS Annual Technical Report, 30 Aug. 1982 - 1 Sep. 1984
P. B. Butler and H. Krier Sep. 1984 178 p
(Grant AF-AFOSR-0145-81)
(AD-A148302; UILU-ENG-84-4010; AFOSR-84-1101TR) Avail: NTIS HC A09/MF A01 CSCL 19/4

Increasing the nitramine content of solid rocket propellants increases the overall performance of the system as well as the

sensitivity to detonation by shock initiation. Under certain circumstances Deflagration to Detonation Transition (DDT) can occur in high-energy solid propellant that has been granulated. The work presented in this report represents an effort to analyze three distinct ways in which high-energy solid propellant can undergo a DDT. The emphasis of the research is on the transient events prior to the detonation as well as the steady state detonation conditions. The system of partial differential equations describing one-dimensional, two-phase, reactive flow are solved by a Method of Lines (MOL) computer solution technique. Predictions for CJ(Chapman Jouguet State) properties, detonation run-up distance and detonation velocity compare favorably with experimental data and predictions made using the TIGER chemical equilibrium computer code. GRA

N85-17157# Atlantic Research Corp., Alexandria, Va.
FUEL-RICH SOLID PROPELLANT BORON COMBUSTION Annual Report, 1 Apr. 1983 - 31 Mar. 1984
M. K. King, J. Komar, and R. S. Fry 31 May 1984 21 p
(Contract F49620-81-C-0035)
(AD-A148522; Rept-41-5032-3; AFOSR-84-1071TR) Avail: NTIS HC A02/MF A01 CSCL 21/9

Single particle boron ignition and combustion models developed in earlier phases of this program have been utilized and extended to treatment of boron cloud ignition, oxidizer depletion effects on cloud combustion time, laminar flame speeds in boron dust clouds, agglomerate ignition, and the effects of halogens, lithium fluoride coatings, and metal coatings on particle ignition. In addition, they have been utilized in a modular combustor model (well-stirred reactor followed by a two-dimensional mixing zone) of boron slurry combustion. Critical deficiencies in knowledge of processes of condensation of various boron oxides/hydroxides have been defined and an experiment to better quantify and understand these processes has been designed. An experimental program for definition of kinetics of boron oxide liquid plus water vapor (important to boron particle ignition) has been carried out. A comprehensive data base of ignition and combustion times for small (10 to 50 micron) boron particles in various wet and dry environments has been developed and a limited experimental study of the effects of LiF coatings on boron ignition performed. Finally, experiments aimed at characterizing dominant processes is boron solid-fuel Ramjet combustion, utilizing a windowed slab burner, have been accomplished. Author (GRA)

N85-17158# Department of the Navy, Washington, D. C.
1-FLUORO-1,1,5-TRINITRO-3-OXA-5-AZAHEXANE AND METHOD OF PREPARATION Patent Application
T. C. Adams, Jr. and H. G. Adolph, inventors (to Navy) Filed 29 Jun. 1984 10 p
(AD-D011421; US-Patent-Appl-SN-626510) Avail: NTIS HC A02/MF A01 CSCL 19/1

An object of this invention is to provide a new energetic compound. Another object of this invention is to provide a new energetic plasticizer for explosives and propellants. A further object of this invention is to provide a high energy plasticizer which is more chemically and thermally stable than nitroglycerin. Yet another object of this invention is to provide an energetic plasticizer which is less volatile than nitroglycerin. These and other objects of this invention are achieved by providing, 1-fluoro-1,1,5-trinitro-3-oxa-5-azahexane which is prepared by reacting one mole of an acetate with one mole of 2-fluoro-2,2-dinitroethanol. GRA

N85-16939*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CRYOGENIC PROPELLANT MANAGEMENT: INTEGRATION OF DESIGN, PERFORMANCE AND OPERATIONAL REQUIREMENTS
Armis L. Worlund, John R. Jamieson, Jr., Timothy W. Cole (Martin Marietta Corp., New Orleans, La.), and Tibor I. Lak (Rockwell International Corp., Downey, Calif.) *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 585-599 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 21I

N85-17004*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ACTIVE COOLING REQUIREMENTS FOR PROPELLANT STORAGE
Gail A. Klein *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 165-177 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 21I

N85-17005*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROPELLANT TRANSFER: ATTACHED DEPOT
Ralph N. Eberhardt *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 179-190 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 21I

N85-17006*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PROPELLANT TRANSFER: TETHERED DEPOT
K. Kroll *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 191-206 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 21I

N85-17007*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OTV FLUID MANGEMENT SYSTEMS
L. Hastings *In* NASA. Lewis Research Center OTV Propulsion Issues Apr. 1984 p 207-228 refs (For primary document see N85-16989 08-15)
Avail: NTIS HC A13/MF A01 CSCL 21I

N85-17028# Bundesinstitut fuer Chemisch-Technische Untersuchgen, Swisttal-Heimerzheim (West Germany).
SENSITIVITY TESTS FOR SOLID PROPELLANTS IN GERMANY
F. Trimborn *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 5 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17029# Propellants, Explosives and Rocket Motor Establishment, Waltham Abbey (England).
SENSITIVENESS AND EXPLOSIVENESS ASSESSMENT AT PERME WALTHAM ABBEY
D. C. Mullenger *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 8 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17030# Illinois Univ., Urbana-Champaign. Dept. of Mechanical and Industrial Engineering.
ANALYSIS OF DEFLAGRATION TO SHOCK TO DETONATION TRANSITION (DSDT) IN POROUS ENERGETIC SOLID PROPELLANTS
P. Barry Butler and Herman Krier *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 10 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17031# Norwegian Defence Research Establishment, Kjeller.
PENGUIN WARHEAD SAFETY TESTS
E. Stromsoe, A. Oddan, and L. Omholt *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 9 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17034# Propellants, Explosives and Rocket Motor Establishment, Waltham Abbey (England).
CRACK GROWTH IN PROPELLANTS
R. A. Gledhill and A. J. Kinloch *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 7 p refs (For primary

document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17035# California Univ., Livermore. Lawrence Livermore Lab.
RESPONSE OF PROPELLANTS TO HIGH DYNAMIC STRESSES: THE USES OF GUN LAUNCH TECHNIQUES
E. L. Lee, E. James, L. Green, W. VonHolle, C. Tarver, D. Curran (Stanford Research Intern., Menlo Park, Calif.), W. Murri (Stanford Research Intern., Menlo Park, Calif.), and D. Seaman (Stanford Research Intern., Menlo Park, Calif.) *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 32 p refs Previously announced as N85-11259 (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17036# Ballistic Research Labs., Aberdeen Proving Ground, Md.
SOME ASPECTS OF THE MICROMECHANICS OF HOT SPOT FORMATION IN ENERGETIC MATERIALS
Robert B. Frey *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 14 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17038# Naval Surface Weapons Center, White Oak, Md.
THE DDT PROCESS FOR HIGH ENERGY PROPELLANTS
Richard R. Bernecker *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 16 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17040# Los Alamos Scientific Lab., N. Mex.
SHOCK AND IMPACT RESPONSE OF SOLID ROCKET PROPELLANTS: EXPERIMENTAL AND THEORETICAL
John K. Dienes and Jerry J. Dick *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 16 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17041# Bundesinstitut fuer Chemisch-Technische Untersuchgen, Swisttal-Heimerzheim (West Germany).
BALLISTIC/DETONIC TRANSITION OF PROPELLANTS
C. O. Leiber *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 14 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17043# Prins Maurits Lab. TNO, Rijswijk (Netherlands).
THE HEAT SENSITIVITY OF SOLID PROPELLANTS
M. A. Schrader, M. W. Leeuw, and A. C. vanderSteen *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 6 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17044# Centre de Recherches du Bouchet, Vert de Petit (France).
MODELLING THE THERMAL EXPLOSION PHENOMENON IN SOLID PROPELLANTS: THE CASE OF FIXED AND VARIABLE TEMPERATURES [MODELISATION DU PHENOMENE D'EXPLOSION THERMIQUE DANS LES PROPERGOLS SOLIDES: CAS DES TEMPERATURES FIXES ET VARIABLES]
D. Casenave and P. Racimor *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 14 p refs In FRENCH (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17045# Institut fuer Chemie der Treib- und Explosivstoffe, Pfinztal (West Germany).
DETERMINATION OF THE DECOMPOSITION BEHAVIOR OF DOUBLE BASE PROPELLANTS AT LOW TEMPERATURES
F. Volk *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 7 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

N85-17046# Politecnico di Milano (Italy).
THE PRESSURE DEFLAGRATION LIMIT OF SOLID ROCKET PROPELLANTS
L. DeLuca, G. Riva, C. Zanotti, R. Donde, V. Lapegna, and A. Oleari *In* AGARD Hazard Studies for Solid Propellant Rocket Motors Sep. 1984 16 p refs (For primary document see N85-17025 08-20)
Avail: NTIS HC A13/MF A01

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N85-17159 Rolls-Royce Ltd., London (England).
FLEXIBLE MANUFACTURING SYSTEM FOR THE PRODUCTION OF AIRCRAFT PARTS
M. Weck et al 13 Nov. 1984 16 p refs Transl. into ENGLISH from Ind. Anzeiger (West Germany), v. 10, no. 32, 20 Apr. 1979 p 42-46
(BLL-PNR-90237-(899.3153)) Avail: British Library Lending Div., Boston Spa, Engl.

The flexible manufacturing system for the machining of integral aircraft components not only comprises control functions for numerical control machines and material flow in the data management and distribution system but also includes a complex processing system for organization data. Especially important is the automatic data feedback from the production line, the prompt availability of data to the associated sectors of the firm contributing towards shorter planning and decision times. The deliberate creation of sub-systems which operate independently, and the material flow control and monitoring system for interlinked machines, also provides the condition which allows them to be used on their own in similar fields of application or as stages in a gradual expansion of a manufacturing system. B.G.

N85-17160 British Gas Corp., London (England).
APPLICATION OF ELECTRICITY TO THE REHEATING OF METALS PRIOR TO FORMING. FORGING, LAMINATION, INDUCTION
R. Courdille 26 Sep. 1984 29 p refs Transl. into ENGLISH from Electric Furnace J., v. 87, no. 10, Dec. 1982 p 13-21
(BLL-Tr-T6399/BG/MRS14903/84) Avail: British Library Lending Div., Boston Spa, Engl.

The essential points characterizing the operating conditions of both electric heating and flame heating are examined for two categories: (1) reheating furnaces in small-forge, die stamping, and stamping shops; and reheating furnaces equipping the trains of rolling mills and presses. Results are used in problem solving. B.G.

N85-17161 National Physical Lab., Teddington (England).
ERROR AND UNCERTAINTY
P. J. Campion Oct. 1984 5 p
(NPL-DPMA-2; ISSN-0267-1387) Copyright. Avail: Issuing Activity

Problems with using the terms error and uncertainty in metrology are reviewed. Difficulties arise when error is used to describe what comes after the + or - sign and also to describe totally different statistical concepts such as standard error of the mean. The use of the terms random and systematic uncertainty after + or - is recommended. Author (ESA)

N85-17162# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
THE EFFECTS OF MANUFACTURING AUTOMATION ON THE SURGE AND MOBILIZATION CAPABILITIES OF THE GAS TURBINE ENGINE INDUSTRY M.S. Thesis
F. E. Dressel and V. F. Gaul Sep. 1984 101 p

(AD-A147295; AD-E500683; AFIT/GSM/LSY/84S-9) Avail: NTIS HC A06/MF A01 CSCL 05/1

This thesis determines the effects of manufacturing automation on the surge and mobilization capabilities of the gas turbine engine industry. Five specific manufacturing characteristics are investigated: labor, flexibility, manufacturing inputs, equipment utilization, and lead time. The combined information showed mostly positive effects on surge and mobilization. Some areas showed no effect due to automation and the only negative effect was in one aspect of mobilization. Both companies reported an increased reliance on foreign suppliers for equipment and machinery, which would hamper their ability to expand their facilities during mobilization. Positive effects are anticipated for both surge and mobilization through increased flexibility, reduced labor requirements, and reduced manufacturing inputs requirements. Finally, the positive effects on these characteristics combined, are expected to significantly reduce the lead time required to deliver engine components and thereby for the engines themselves. GRA

N85-17163# Army Industrial Base Engineering Activity, Rock Island, Ill. Manufacturing Technology Div.
MANUFACTURING METHODS AND TECHNOLOGY PROJECT SUMMARY REPORTS Semiannual Report, Jan. - Jun. 1984
Jun. 1984 226 p
(AD-A148209; AD-E700010) Avail: NTIS HC A11/MF A01 CSCL 13/8

This report contains summaries of 100 projects that were completed under the Army's Manufacturing Methods and Technology (MMT) Program. The MMT Program was established to upgrade manufacturing facilities used for the production of Army materiel. The summaries highlight the accomplishments and benefits of the projects and the implementation actions underway or planned. Points of contact are also provided for those who are interested in obtaining additional information. GRA

N85-17164# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
NO-SLUMP ROLLER-COMPACTED CONCRETE (RCC) FOR USE IN MASS CONCRETE CONSTRUCTION Final Report
K. L. Saucier Oct. 1984 46 p
(AD-A148564; WES/TR/SL-84-17) Avail: NTIS HC A03/MF A01 CSCL 11/2

The use of no-slump, roller-compacted concrete (RCC) in mass concrete construction was investigated. RCC is concrete having no slump but containing the minimum amount of water necessary to achieve consolidation with a vibrating roller. Tests were conducted to: (1) optimize mixtures for application of no-slump techniques, (2) develop a consistency and quality control technique, (3) determine methods of improving hardened lifts joints, (4) determine the relative frost resistance of RCC, (5) evaluate the erosion susceptibility, and (6) discover economical methods of obtaining void-free vertical surfaces. Indications are that: (1) the curb concrete is viable method of forming and containing RCC; (2) the degree of compaction achieved is dependent on the stiffness and the paste content of the mixture, the lift thickness, and the individual roller; (3) the tensile strength of the untreated joints increased with paste content and quality from approximately 25 percent for relatively lean RCC to approximately 50 percent for richer RCC; (4) erosion resistance at 35-ft/sec fluid velocity of RCC is good; (5) resistance to freezing and thawing of the RCC is poor, apparently due to a poor air void system; and (6) surface treatment with a mortar gun (shotcrete) appears to be a practical method to achieve smooth vertical surfaces. GRA

N85-17165# Department of the Navy, Washington, D. C.
IMPROVEMENTS IN LINKED-SPAR MOTION-COMPENSATED LIFTING SYSTEM Patent Application
R. A. Olsen and R. A. Cuthbertson, inventors (to Navy) Filed 4 Oct. 1984 22 p
(AD-D011413; US-Patent-Appl-SN-657641) Avail: NTIS HC A02/MF A01 CSCL 13/10

An improved system for operating a lifting cable over the side of a ship at sea in which a spar buoy having an adjustable lifting capacity is coupled to the shop by a rigid linkage which is free to pivot on an axis attached to the ship deck, and operates to decouple the motion of the ship from lifting cable. The spar buoy is attached to a gimbal sheave assembly having a disengageable connector and tension line for drawing the connector into engagement with a mating socket at the outward end of a linkage boom. A narrow upper section of the spar buoy is provided with a plurality of vertical tubes and valves which by flooding or evacuation operate to vary the effective water plane area of the buoy for continual fine tuning and optimally adjusting of its natural heave mode characteristic frequency. Author (GRA)

N85-17166# Winter (Ernst) und Sohn G.m.b.H. und Co., Hamburg (West Germany).
PROCESS DEVELOPMENT FOR THE PRODUCTION OF TECHNICALLY HIGH QUALITY MONOCRYSTALLINE DIAMOND GRITS Final Report, Jun. 1982
Dietrich Borse Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 94 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-204; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18,50

The manufacture of synthetic diamond grits for diamand tools and machining processes was improved. A synthesis test equipment was developed and used for test series. After optimizing heating-system, synthesis conditions and reactive materials, high quality diamond grits were produced in test quantities. An equipment for the manufacture of larger diamond quantities, producing 45 kt diamond per pressing was constructed. Diamond grits produced on this equipment show the same high quality. Results are confirmed by application tests in comparison with commercially available diamond grits. Author (ESA)

N85-17167# National Inst. voor Kernfysica en Hoge Energieysica, Amsterdam (Netherlands).
DESIGN STUDY OF THE VACUUM PUMP OF THE ESRP
A. P. Kaan and J. F. J. vandenBrand 1984 25 p
(NIKHEF-MTG-21) Avail: NTIS HC A02/MF A01

The vacuum system of a synchrotron radiation device was studied by a static and dynamic finite element method. Results reveal the possibility of pumping this system only by lumped pumps, by localizing most of the radiation-induced gas load at a number of special absorbers (crotches). Calculations indicate 256 starcell-type ion pumps and 64 conventional sputter-ion pumps. An extra blind flange on these pumps provides for the installation of multifilament titanium sublimation pumps. Total desorption during operation estimated at 0.000018 Torr/sec and a total pumping speed of 22.400/sec result in an average pressure of 1.1 times 10 to the minus 9th power Torr (79% effective pumping speed). Dynamical calculations indicate a pumpdown time of 500 hr. Author (ESA)

N85-17168# Joint Publications Research Service, Arlington, Va.
USSR REPORT: MACHINE TOOLS AND METALWORKING EQUIPMENT
20 Dec. 1984 51 p ref Transl. into ENGLISH from various Russian articles
(JPRS-UMM-84-021) Avail: NTIS HC A04

Developments in the production and manufacturing of machine tools and metalworking are reported. Topics discussed include: industry planning and economics, metal cutting and metal forming machine tools, robotics, process controls and automation electronics, technology planning and management automation. For individual titles, see N85-17169 through N85-17171.

N85-17169# Joint Publications Research Service, Arlington, Va.
CONTROL SYSTEMS FOR ROBOTIC PRODUCTION LINES **c37**
L. Y. Lerner and V. R. Lifman *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-021) 20 Dec. 1984 p 17-23 Transl. into ENGLISH from Mekhan. i Avtomatiz. Proizv.

(Moscow), no. 5, May 1984 p 4-5 (For primary document see N85-17168 08-31)
Copyright. Avail: NTIS HC A04

Progressive technological processes that use industrial robots were introduced. It is shown that the best results are given by robotic lines that are designed to manufacture a specific group of parts and operate under the same production processes. The approach to the problem of automation allows to exclude interval manual stockpiling, the metalworking process can be further roboticized. Automation increases productivity and reduce living labor costs. E.A.K.

N85-17170# Joint Publications Research Service, Arlington, Va.
TECHNOLOGY PLANNING FOR FLEXIBLE MANUFACTURING SYSTEMS
A. D. Chudakov and B. Ya. Falevich *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-021) 20 Dec. 1984 p 37-42 Transl. into ENGLISH from Avtomob. Promysl. (Moscow), no. 8, Aug. 1984 p 1-3 (For primary document see N85-17168 08-31)
Copyright. Avail: NTIS HC A04

The machine building industry features a new type of equipment, the flexible technological systems for machining. These systems are based on the use of machine tools with CNC, linked to a central controlling computer and an automated transport and stockpiling system. To improve the effectiveness of integrated operation of the system's equipment, the software of the central computer includes an applied program package directed toward the performance of automated planning functions, which, together with the operating documentation, makes up a system of operational calendar planning. E.A.K.

N85-17171# Joint Publications Research Service, Arlington, Va.
AUTOMATED PLANT, PRODUCTION MANAGEMENT SYSTEM
V. I. Aksenova and V. I. Belov *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-021) 20 Dec. 1984 p 43-47 Transl. into ENGLISH from Mekhan. i Avtomatiz. Proizv. (Moscow), no. 5, May 1984 p 39-40 (For primary document see N85-17168 08-31)
Copyright. Avail: NTIS HC A04

The development of a complex of tasks for the operational management of production (OUP) within the framework of an automated system for production management (ASUP) shows that it is impossible to have effective computations without reliable initial information. The influence of many factors involving the production and economic activity of the entire enterprise upon the plan and course of production are considered. It is suggested that an adequate model should be available which covers all levels of the hierarchical system: workplace, section (bridgade), shop, enterprise, and the model should be incorporated into the technological sequence of performance and there should be provisions for an adequate man machine system. E.A.K.

N85-17172# Joint Publications Research Service, Arlington, Va.
USSR REPORT: MACHINE TOOLS AND METALWORKING EQUIPMENT
3 Jan. 1985 50 p Transl. into ENGLISH from various Russian articles
(JPRS-UMM-85-001) Avail: NTIS HC A03

Research and progress in the developmentof machine tools and metal working equipment are reported. Topics discussed include: industry planning and economics, metal cutting and metal forming machine tools, easer cutting technology, and robotics. For individual titles, see N85-17173 through N85-17175.

N85-17173# Joint Publications Research Service, Arlington, Va.
SUMMARIES OF PRESS AUTOMATION CONFERENCE PRESENTED
A. Yu. Makhlin and G. M. Pokrovskaya *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-85-001) 3 Jan. 1985 p 1-9 Transl. into ENGLISH from Kuznechno-Shtampovochnoye Proizv. (Moscow), no. 2, Feb. 1984 p 35-37 (For primary document see N85-17172 08-31)
Copyright. Avail: NTIS HC A03

The automation and mechanization of cold and hot stamping were discussed. Problems in the comprehensive mechanization and automatio of stamping in machine building development were examined. Automation becomes effective when it is implemented in progressive manufacturing processes and a comprehensive approach to the solution of all problems, beginning with the delivery of initial materials and ending with the transportation of finished products to the warehouse. Production intensification and improvments of effectiveness of produced output through the comprehensive mechanization and automation of stamping operations are reported. E.A.K.

N85-17174# Joint Publications Research Service, Arlington, Va.
DESIGN FEATURES, APPLICATIONS OF NEW ROBOTS c37
V. I. Kharkov *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-85-001) 3 Jan. 1985 p 31-44 Transl. into ENGLISH from Mekhan. i Avtomatizatsiya Proizv. (Moscow), no. 5, May 1984 p 41-46 (For primary document see N85-17172 08-31)
Copyright. Avail: NTIS HC A03

The Automatic Manipulators were updated for the third time. The new displays are discribed. The economic impact of the automatic welder, which can be used to wald various items which require rotation and tilting during processing is examined. The new design features are outlined. E.A.K.

N85-17175# Joint Publications Research Service, Arlington, Va.
NEW APPLICATIONS FOR ROBOT LOADERS, UNLOADERS c37
A. Mishin *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-85-001) 3 Jan. 1985 p 45-46 Transl. into ENGLISH from Ekon. Gazeta (Moscow), no. 33, Aug. 1984 p 24 (For primary document see N85-17172 08-31)
Avail: NTIS HC A03

Practical applications of industrial robots and robotized manufacturing complexes are presented. Each of the more than 100 intelligent machines which lessen human labor and free it from heavy and montonous operations, is in production. An A711b09 automated complex for pressure casting is outlined. Three manipulators and a device for lubricating the plunger replace heavy manual labor in the manufacture of nonferrour metal castings. The TKhP78 shelf manipulator solves the problem of automational heavy physical labor. It loads and unloads work in production and storage facilities. The high fatigue rate for workers in some operations is explained by the laboriousness, and the monotony of the operations performed. The two handed industrial robot can hourly check more than 400 switches without errors. E.A.K.

N85-17176# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
26 Dec. 1984 45 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-84-046) Avail: NTIS HC A03/MF A01

News items, abstracts, and scientific reports on aspects of science and technology including robotics, man machine systems, artificial intelligence, telecommunications, microcomputers, laser, and genetic engineering are described. For individual titles, see N85-17177 through N85-17182.

N85-17177# Joint Publications Research Service, Arlington, Va.
MAN-MACHINE COMMUNICATION RESEARCH FOR ROBOTICS REPORTED c37
Karl-Heinz Tempelhof and Rudolf Meyer *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 1-3 Transl. into ENGLISH from Volksstimme (Magdeburg), 18 May 1984 p 4 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

Speech recognition systems in robotics are reviewed. Future trends in speech communication processes are examined along with primary applications. B.G.

N85-17178# Joint Publications Research Service, Arlington, Va.
ROBOTICS APPLICATION IN CONSTRUCTION INDUSTRY ASSESSED c37
Hans Erdmann *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 4-5 Transl. into ENGLISH from Berliner Zeitung (East Berlin), 1 Aug. 1984 p 3 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

The use of robotics within the construction industry in Berlin is reviewed. The criteria for effective implementation of robots is the release of members of the work force as well as maximum utilization of robots on a daily basis. Actual performance is compared to projected goals. B.G.

N85-17179# Joint Publications Research Service, Arlington, Va.
TELECOMMUNICATIONS EQUIPMENT AT 1984 LEIPZIG SPRING FAIR c32
K. H. Weidenbruch et al *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 8-25 Transl. into ENGLISH from Nachrichtentech.-Elektron. (East Berlin), no. 3, 1984 p 83-86 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

Radio and telecommunications technology (RFT) communication electronics for world-wide communications was the governing topic under which the VEB Combine Communication Electronics presented its Fair equipment for the 1984 Leipzig Spring Fair. The high scientific-technical level of devices and systems from the GDR becomes clear in five user-oriented equipment complexes in conjunction with other combines, using selected problem and system solutions as examples. New documentation is presented using micro-electronics, digital technology, optoelectronics, and fiber-optic light-guide communication transmission in a well-directed manner, and which can satisfy even the most stringent claims as regards utility for the user, use-value properties, weight/performance ratio, specific energy consumption, as well as easy assembly and optimum service. B.G.

N85-17180# Joint Publications Research Service, Arlington, Va.
FAST ARITHMETIC FOR MICROCOMPUTERS c61
Frank Markert *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 35 refs Transl. into ENGLISH from Radio Fernsehen Elektron. (East Berlin), v. 32, no. 8, 1983 p 487-490 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

For many tasks the processing speed of microcomputers is insufficient for arithmetic operations. For picture processing tasks simple arithmetic operations are often needed which have to be applied to a large data base. In the manipulation of geometric objects, the geometric operations must be applied to all significant object data in sequence. The frequent requirement for real-time processing cannot be satisfied by simple software implementation. A hardware upgrade and implementation of selected arithmetic operations can be a remedy here. The K 1520 microcomputer suffers from the above disadvantages, but a multiplier is described which can perform simple and more complex arithmetic and trigonometric operations. This multiplier is linked to the system bus via memory mapping. The arithmetic algorithm is described. With this unit arithmetic processing times reduced by 10 to 100 times are possible for certain tasks. But the equipment is expensive, uses considerable energy and takes up considerable space. These capabilities represent an interim solution until more powerful arithmetic processors become available. Author

N85-17181# Joint Publications Research Service, Arlington, Va.
ELECTRONICS COMPONENT R AND D, PRODUCTION CAPABILITY REVIEWED c33
Hans-Friedrich Hadamovsky *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 36-39 Transl. into ENGLISH from Spectrum (East Berlin), v. 15, no. 9, 1984 p 9-10 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

The following outstanding scientific achievements were presented: (1) the schottky diode, which doubled the efficiency of combinatorial circuit parts, and (2) electronic temperature and pressure control coupling to attain synthesis of materials. B.G.

N85-17182# Joint Publications Research Service, Arlington, Va.
CONSTRUCTION, TESTING OF 1-MW NITROGEN LASER c36
R. Weidauer, A. Glismann, R. Konig, and H. Falk *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 40-41 refs Transl. into ENGLISH from Feingeratetech. (East Berlin), v. 33, no. 5, 1984 p 204-206 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

Nitrogen lasers (N2-lasers) have achieved considerable importance since their discovery in 1963. Preferred as pump light sources for nanosecond pigment lasers they are also used in photolysis experiments, fluorescence decay time measurements, in the determination of air pollution, the detection of oil traces or in material processing in semiconductor and microelectronics. The laser energy was measured by means of an absolutely calibrated, pyro-electric receiver; the pulse shape was determined by means of a fast photocell in combination with an SU-oscilloscope I 2-7. The time resolution of the overall system was about 0.5 ns. For measurements it was important to take into account that besides the strong UV-radiation at 337.1 nm, radiation was also emitted in the near IR between about 870 nm and 900 nm. The IR pulse exits from the laser with about 10 ns delay to the UV-pulse; its pulse width was measured at 7 ns, whereas that of the UV-signal amounts to 12 ns under optimum conditions. The energy in the IR-range amounts to around 5 percent of the UV-energy. By means of a dielectric edge filter (KCZ) the IR-fraction was reduced to less than about 0.5 percent in order to prevent falsification of the values when measuring in the UV-range. B.G.

N85-17183# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
28 Dec. 1984 53 p Transl. into ENGLISH from various East European articles
(JPRS-ESA-84-047) Avail: NTIS HC A04/MF A01

News items, abstracts and scientific reports on aspects of science and technology including robotics, high pressure physics; computers; fiber optics; and data processing are described. For individual titles, see N85-17184 through N85-17189.

N85-17184# Joint Publications Research Service, Arlington, Va.
RESEARCHERS ON THIRD GENERATION ROBOTICS DEVELOPMENT c37
Martin Schroeter *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) 28 Dec. 1984 p 1-3 Transl. into ENGLISH from Leipziger Volkszeitung (Leipzig), 19 - 20 May 1984 p 9 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

An overview of the history of robotics in steel manufacturing is given. B.G.

N85-17185# Joint Publications Research Service, Arlington, Va.
HIGH PRESSURE PHYSICS RESEARCH FOCUSING ON COMPOSITE MATERIALS c24
Heinz Stiller *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) 28 Dec. 1984 p 4-5 Transl. into ENGLISH from Spectrum (East Berlin), v. 15, no. 9, 1984 p 10-11 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

High-pressure physics, in some instances in conjunction with high temperatures, investigates the effects of high and ultra-high pressures on the states and characteristics of matter. The permanent change or transformation of materials under high pressures and temperatures as well as the ability to precisely control their characteristics were investigated. B.G.

N85-17186# Joint Publications Research Service, Arlington, Va.
FLEXIBLE MANUFACTURING SYSTEM CONCEPT FEATURES CACHE MEMORY Abstract Only c61
Gerhard Stehfest *In its* East Europe Rept.: Sci. and Technol.

(JPRS-ESA-84-047) 28 Dec. 1984 p 12 Transl. into ENGLISH from Freiheit (Halle), 19 Oct. 1984 p 8 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

Development technology with an emphasis on robotics, numerical control, and patents was discussed. B.G.

N85-17187# Joint Publications Research Service, Arlington, Va.
ES DEVICES AT FAIR **c60**
Zoltan Szabo *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) 28 Dec. 1984 p 18-21 Transl. into ENGLISH from Szamitastech. (Budapest), no. 10, Oct. 1984 p 3 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

The D-100 and D-200 matrix printers, ES 1061 computer, microcomputers, mutliprogramming, magnetic disks, applications program library and software engineering were discussed. B.G.

N85-17188# Joint Publications Research Service, Arlington, Va.
SPECIFICATIONS OF BLOC FLOPPY DISK DRIVES **c60**
Attila Kovacs, comp. *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) 28 Dec. 1984 p 22-23 Transl. into ENGLISH from Szamitastech. (Budapest), no. 10, Oct. 1984 p 5 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

The characteristics of domestically manufactured drive units for floppy disk stores which can be connected to micro and minicomputers are compared. A large part of the drive units were testetd in the MSZR (minicomputer system) and are now obtainable within the socialist affiliation are identical with loose with ESZR code numbers. The data given in the table come from the domestic manufacturers, and in part from the importing foreign trade enterprise. B.G.

N85-17189# Joint Publications Research Service, Arlington, Va.
MOM PERIPHERALS **c60**
Karoly Molnar *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) 28 Dec. 1984 p 25-30 Transl. into ENGLISH from Szamitastech. (Budapest), no. 10, Oct. 1984 p 1, 5 and 7 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

Hungarian Optical Works (MOM) began large series manufacture of computer peripherals about 15 years ago. Floppy disk development is discussed along with marketing predictions for the future. B.G.

N85-17190# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY
2 Jan. 1985 81 p refs Transl. into ENGLISH from various West European articles
(JPRS-WST-85-001) Avail: NTIS HC A05/MF A01

Progress in West European science and technology is reported. The report includes the following topics: aerospace technology, automobile industry, civil aviation, computers, factory automation, microelectronics, scientific and industrial policy, and technology transfer. For individual titles, see N85-17191 through N85-17197.

N85-17191# Joint Publications Research Service, Arlington, Va.
FRG STUDY LOOKS AT PARTICIPATION IN ESA, US SPACE STATION **c12**
Goetz Wange *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 1-3 Transl. into ENGLISH from Flugrev. (Munich), Oct. 1984 p 30-31 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

International cooperation in space exploration was examined. The participation of the European Space Agency (ESA) in the U.S. Space Station is discussed. Joint technological ventures, economics, and costs are investigated. E.A.K.

N85-17192# Joint Publications Research Service, Arlington, Va.
BBC OF SWITZERLAND DEVELOPS ELECTRIC CAR **c85**
In its West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 4-5 Transl. into ENGLISH from Frankfurter Zeitung/Blick Durch die Wirtsch. (Frankfurt/Main), 2 Nov. 1984 p 7 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

The development of a high performance electric car is discussed. Special attention is paid to the manufacturing of a high energy electric battery. The sodium-sulfur battery is chosen because: (1) the adequate supply of materials, and (2) the energy density of a sodium-sulfur battery is three to five times higher than lead-acid batteries. The development of a drive systems resulted in a direct current drive with gearbox and control electronics. E.A.K.

N85-17193# Joint Publications Research Service, Arlington, Va.
FRG CERAMIC ENGINE COMPONENTS (PET) Abstract Only **c37**
In its West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 6 Transl. into ENGLISH from Frankfurter Zeitung/Blick Durch die Wirtsch. (Frankfurt/Main), 1 Nov. 1984 p 7 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

Ceramic engine components for spark ignition and diesel engines for the development of ceramic rotors and ceramic-lined turbocharger housing are discussed. Ceramic port liners for thermal insulation of the exhaust gas channel in the cylinder head are cast into the cylinder head using improved manufacturing methods. Less heat would be given off by the cooling system, the exhaust temperatures would rise, hydrocarbon emissions would drop by 10% and catalytic treatment of the exhaust gases would be more favorable. The lining of the exhaust manifolds was investigated. It is difficult to manufacture the necessary shape while simultaneously adhering to close manufacturing tolerances. The ceramic lining of the combustion chamber still needs more development. Designs which lend themselves to ceramic linings, and the selection of suitable ceramic materials are emphasized. The objective of the development of ceramic engines is the reduction of fuel consumption by nerly 8% which is made possible by higher operating temperatures. Engine heat losses, however, must be minimized, and it is found that ceramics are suitable for this task. E.A.K.

N85-17194# Joint Publications Research Service, Arlington, Va.
DESCRIPTION OF MBB COMPUTERIZED DESIGN TECHNIQUES FOR A320 **c61**
In its West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 7-9 Transl. into ENGLISH from VDI Nachr. (Dusseldorf), 28 Sep. 1984 p 26 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

The design of aircrafts by computerized design techniques is discussed. Picture screen, light marker, and computers are now exclusively the means by which the new Airbus A320 aircraft is built. Complete major structural parts, components, metal and synthetic material structures, down to the smallest sheet metal parts and connection elements are drawn on the picture screen, the drawing data are stored in computers, they are preserved on magnetic tape for use as construction documents, and they are reproduced on microfilm or they are printed out on paper. E.A.K.

N85-17195# Joint Publications Research Service, Arlington, Va.
EUROPEANS ACTIVE IN MAGNETIC BEARING INDUSTRY **c37**
In its West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 19-21 Transl. into ENGLISH from Mondo Econ. (Milan), 25 Oct. 1984 p 69 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

The marketing and development of magnetic bearings for factory machinery automation is discussed. The use of a magnetic field for suspension of the mechanic parts which are used for rotation is outlined. Cost effectiveness and international cooperation in the sale of the magnetic parts are examined. E.A.K.

N85-17196# Joint Publications Research Service, Arlington, Va.
FRENCH RESEARCH ON GALLIUM ARSENIDE DEVICES c76
Y. Segui, B. Moret, and D. Montalan *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 23-36 refs Transl. into ENGLISH from Rev. de Phys. Appl. (Paris), Apr. 1984 p 325-331 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

Polysiloxane films deposited by a reactive plasma at room temperature on GaAs substrates are considered as possible alternatives for the passivation of GaAs devices. Transport phenomena show that polysiloxane films have very good insulating properties with electric fields of up to 5 x 1 million V/cm. The electrical properties of the polysiloxane-GaAs interface are characterized by a U-shaped distribution of interface states in the gap. The minimum value is found at 10 to the 12th power cm 0.01 eV. The structures studied offer adequate stability under 80% relative humidity and a continued applied field of 1.3 x 1 million V/cm. E.A.K.

N85-17197# Joint Publications Research Service, Arlington, Va.
UK, FRG, FRANCE: R AND D IN SENSORS, RELATED FIELDS c35
Thomas Jarne, Jan Hellsten, Karl-Gunnar Nilsson, and Dan Andree *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 37-59 Transl. into ENGLISH from Utlandsrappt. (Stockholm), no. 8402, Aug. 1984 p 43-71; 63-71; 78-88; 91-98 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

Progress in European sensor technology and the marketing of sensors is reported. Fiber optics and fiberoptical transducers and their application to cable television are examined. Image processing development and application, fiberoptic sensors, electrochemical sensors and their use in the electronics industry are outlined. E.A.K.

N85-17198# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
3 Dec. 1984 59 p refs Transl. into ENGLISH from various east European articles
(JPRS-ESA-84-043) Avail: NTIS HC A04/MF A01

New items, abstracts and scientific reports on aspects of science and technology including microprocessors, nuclear reactors, robotics, microelectronics, and software engineering are described. For individual titles, see N85-17199 through N85-17204.

N85-17199# Joint Publications Research Service, Arlington, Va.
MICROPROCESSORS IN GEOPHYSICAL INSTRUMENTS DISCUSSED c60
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-043) 3 Dec. 1984 p 1 Transl. into ENGLISH from Rude Pravo (Prague), 12 Sep. 1984 p 4 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

Microprocessors are used in geophysical instruments employed in prospecting for deposits of mineral raw materials. Such processors decrease the size and weight of the instruments and their energy use. This new series of microprocessor geophysical instruments is raising the quality of measurements by simplifying the work of operators and eliminating the need for manual data processing. All of this will result in improved information quality and will be reflected in the next stages of prospecting for deposits and in the lowered cost of raw materials. B.G.

N85-17200# Joint Publications Research Service, Arlington, Va.
CHEMICAL, MATERIAL ELECTRONICS STUDIES ESTABLISHED c33
Lubomir Hudec *In its* USSR Rept.: Sci. and Technol. (JPRS-ESA-84-043) 3 Dec. 1984 p 5-6 Transl. into ENGLISH from Rude Pravo (Prague), 3 Oct. 1984 p 4 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

Stricter demand for purity and perfection in the materials used in the manufacture of microelectronic components leads to study of the process and quality control of the materials. Czechoslovakia's goals and policies for the future are reviewed. B.G.

N85-17201# Joint Publications Research Service, Arlington, Va.
ROBOTICS RESEARCH, INTEGRATION OVERVIEW PRESENTED. APPLICATION OBJECTIVES CITED c37
G. K. *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-043) 3 Dec. 1984 p 11-15 Transl. into ENGLISH from Volksarmee (East Berlin), no. 5, 1984 p 11 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

Application objectives, use of second generation robotics; sensor systems research; production improvements; and industry assessment are discussed. B.G.

N85-17202# Joint Publications Research Service, Arlington, Va.
GENERAL ASSESSMENT OF GDR MICROELECTRONICS INDUSTRY, APPLICATIONS c33
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-043) 3 Dec. 1984 p 16-21 Transl. into ENGLISH from Presse-Inform. (East Berlin), no. 110, 20 Sep. 1984 p 1-11 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

High growth rates of microelectronic products; potentialities of integration; economic effects; computer supported production management; youth engagement; and consumer goods are discussed. B.G.

N85-17203# Joint Publications Research Service, Arlington, Va.
EDP COMPUTER TAPES DESCRIBED c61
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-043) 3 Dec. 1984 p 22-25 Transl. into ENGLISH from DDR Export (East Berlin), no. 14, 1984 p 12-14 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

Process control of digital recording and storage media (ORWO computer tapes, types 415, 425, and 430, and a digital cartridge, type 490) is discussed. B.G.

N85-17204# Joint Publications Research Service, Arlington, Va.
POLAR RESEARCH IN EARTH SCIENCES DESCRIBED c46
Krzysztof Birkenmajer *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-043) 3 Dec. 1984 p 28-45 refs Transl. into ENGLISH from Nauka Polska (Warsaw), no. 3, May - Jun. 1984 p 33-46 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

Location, group, date, and purpose of the research expeditions by Polish explorers in the Arctic and Antarctic regions are listed. B.G.

N85-17384# Department of Agriculture, Madison, Wis. Forest Products Lab.
SEISMIC PERFORMANCE OF LOW-RISE LIGHT-FRAMED WOOD BUILDINGS
L. A. Soltis *In* Shock and Vibration Information Center The Shock and Vibration Digest, V. 16, No. 11 Nov. 1984 p 27-32 refs (For primary document see N85-17382 08-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N85-17205 British Broadcasting Corp., London (England).
BBC RECEIVING TERMINAL FOR THE EUROPEAN ORBITAL TEST SATELLITE
C. Gandy Dec. 1984 22 p refs

(BBC-RD-1984/15) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

A receiving terminal for reception of frequency modulated television signals in the 11 GHz band from the European orbital test satellite was designed and constructed. The design features a 2.44 m parabolic reflector antenna with a Cassegrian feed employing a corrugated born, a GaAs f.e.t. low noise amplifier and a tunable, dual conversion receiver. Provisions are included for reception of the accompanying sound signals, either as sound in syncs or on a modulated subcarrier. The terminal was used for demonstrations and the monitoring television tests which were performed by using the satellite. The tests include conventional point to point link tests, simulations of direct broadcasting by satellite and commissioning of the BBC transportable satellite Earth station. E.A.K.

N85-17206 British Broadcasting Corp., London (England).
SATELLITE BROADCASTING: THE PERFORMANCE OF C-MAC IN A HARDWARE SIMULATION OF A DBS TRANSMISSION CHAIN
P. Shelswell Sep. 1984 37 p refs
(BBC-RD-1984/9) Avail: BBC, Kingswood Warren, Tadworth, Surrey, Engl.

The C-MAC, a new transmission standard for direct broadcasting by satellite, when passed through a hardware simulation of a complete satellite transmission chain was measured. The quality of the vision and sound were monitored throughout the chain, for the nominal chain and for the chain with deliberately introduced impairments such as noise, interference, amplitude and group delay distortion and nonlinear amplification. It is concluded that C-MAC is a suitable transmission standard for satellite broadcasting. E.A.K.

N85-17207 Department of the Air Force, Washington, D.C.
FAST SWITCHING DRIVER FOR INDUCTIVE LOAD, SUCH AS A PHASE SHIFTER Patent
W. E. Milberger and S. F. Payer, inventors (to Air Force) Issued 4 Sep. 1984 9 p Supersedes AD-D009764
(AD-D011368; US-Patent-4,469,961; US-Patent-Appl-SN-403214; US-Patent-Class-307-270) Avail: US Patent and Trademark Office CSCL 17/9

A dual voltage inductive coil driver is used to rapidly switch between current levels in phase shifters. This approach provides a large voltage swing during the transient period, and then provides a low-dissipation low-voltage source during the steady state condition. The dual mode uses a linear low voltage loop and a nonlinear high voltage loop in the driver. The nonlinear loop may operate from the threshold or difference between either the input reference and coil current or input reference and coil voltage. GRA

N85-17208*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE SIR-B SCIENCE INVESTIGATIONS PLAN
1 Jul. 1984 210 p refs
(Contract NAS7-918)
(NASA-CR-174282; JPL-Pub-84-3; NAS 1.26:174282) Avail: NTIS HC A10/MF A01 CSCL 17I

Shuttle Imaging Radar-B (SIR-B) is the second synthetic aperture radar (SAR) to be flown on the National Aeronautics and Space Administration's Space Transportation System (Shuttle). It is the first spaceborne SAR to feature an antenna that allows acquisition of multiincidence angle imagery. An international team of scientists will use SIR-B to conduct investigations in a wide range of disciplines. The radar, the mission, and the investigations are described. For individual titles, see N85-17209 through N85-17254.

N85-17209*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE SIR-B SCIENCE INVESTIGATIONS PLAN: INTRODUCTION
In its The SIR-B Sci. Invest. Plan 1 Jul. 1984 8 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

The Shuttle Imaging Radar-B (SIR-B) and its capabilities are described. The SIR-B instrument is an upgraded version of SIR-A that has the additional capability of tilting the antenna mechanically to acquire data at incidence angles that vary from 15 to 60 deg. Like SEASAT and SIR-A, SIR-B will be an L-band (23-cm) HH polarized radar. The variable-incidence-angle capability will allow several experiments. A specific area may be imaged with a variety of incidence angles on successive days. These images can then be registered and used to produce curves of backscatter as a function of incidence angle for various terrain types. These curves can be used ultimately to characterize the terrain. Stereo-imaging may also be done in the multiple-incidence-angle mode. In addition, large areas may be imaged and mosaicked together with only slight variations in incidence angle with each swath. R.J.F.

N85-17210*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EXPERIMENT DESCRIPTION
In its The SIR-B Sci. Invest. Plan 1 Jul. 1984 9 p ref (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

The Shuttle Imaging Radar-B (SIR-B) and its subsystems are described. The antenna and the radar sensor are subsystems carried over from SIR-A to SIR-B with some modifications. The optical recorder (OR) is unchanged from that used in SIR-A. Important new elements in SIR-B are antenna electronics that allow selectable look angles, a digital data handling subsystem (DDHS), increased bandwidth, a calibrator, and a digital data processor on the ground. A list of the SIR-B characteristics is given. Radio-frequency (RF) pulses at 1.28 GHz (L-band) are generated in the transmitter portion of the sensor and radiated by the antenna. The RF signals are reflected from the Earth, collected by the antenna, and sent to the receiver portion of the sensor where they are beaten down to baseband to form the offset video output. This output is then sent to either the CR, the DDHS, or both. An end to end system block diagram is given. R.J.F.

N85-17211*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SIR-B COVERAGE
In its The SIR-B Sci. Invest. Plan 1 Jul. 1984 12 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

The planned coverage with the Shuttle Imaging Radar-B (SIR-B) is described in detail. A total of about 60-million square km of coverage will be acquired including 50 h of Tracking and Data Relay Satellite (TDRS) data and 8 h of optically recorded data. In general, data will be acquired directly through TDRS whenever possible; however, because of certain constraints imposed by having just one TDRS in orbit during the time of this mission, many digitally taped data takes will be required. (Each separate SIR-B observation is designed as a data take). Optical data takes will be taken only over sites that cannot be acquired either directly through TDRS or on a digital tape. It is important to note that, although a digital data take may be acquired at any time during the mission, it will be necessary to dump that data take through TDRS at some later time, or replace the tape onboard the Shuttle with another blank tape. R.J.F.

N85-17212*# Institute of Oceanographic Sciences, Wormley (England).
THE INTERPRETATION OF SIR-B IMAGERY OF SURFACE WAVES AND OTHER OCEANOGRAPHIC FEATURES USING IN-SITU, METEOROLOGICAL SATELLITE, AND INFRARED SATELLITE DATA
T. Allan, T. Guymer, and P. Muller (Imperial Coll., London) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 13 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

The overall aim is to interpret Shuttle Imaging Radar-B imagery

of selected ocean areas near the United Kingdom using available data from ships and buoys, with particular emphasis on understanding the mechanisms involved in the backscattering of microwaves from the sea surface and their relationship to surface gravity waves. The secondary objective is to use a multispectral approach to study sea-surface expressions such as slicks, internal waves, and eddies. Data acquisition, handling, and analysis approaches and expected results are discussed. R.J.F.

N85-17213*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE SPATIAL EVOLUTION OF T HE DIRECTIONAL WAVE SPECTRUM IN THE SOUTHERN OCEAN: ITS RELATION TO EXTREME WAVES IN AGULHAS CURRENT
R. C. Beal, A. Goldfinger, D. Irvine, F. Monaldo, D. Tilley (ERIM, Ann Arbor), R. Shuchman (NOAA, Washington, D.C.), D. Lyzenga (ERIM, Ann Arbor), J. Lyden (ERIM, Ann Arbor), P. DeLeonibus (NOAA, Washington, D.C.), C. Rufenach (Cape Town Univ.) et al *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs Prepared in cooperation with APL, Laurel, Md. (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

An experiment using the Shuttle Imaging Radar-B (SIR-B) to monitor certain properties of the ocean wave directional spectrum and to track the long swell systems as they propagate northward to encounter the Agulhas near the southeastern coast of Africa is discussed. The experiment is designed around the unique capability of SIR-B to overcome key limitations of the Seasat synthetic aperture radar data set, and to extend the existing Seasat results into new areas. Ocean wave systems will be tracked. The variable-incidence-angle capability to examine wave imaging quality will be utilized. Doppler current measurements will be attempted. An effort will be made to verify that the lower range-to-velocity ratio of SIR-B will lead to the improved response of azimuth-traveling wave systems. R.J.F.

N85-17214*# Geological Survey, Flagstaff, Ariz.
APPLICATION OF SIR-B DATA FOR GROUNDWATER EXPLORATION IN THE ARABIAN SHIELD AND SAND-DRIFT MONITORING IN THE AN NAFUD AND AL JAFURAH FRINGE AREAS, KINGDOM OF SAUDI ARABIA
G. L. Berlin, M. A. Tarabzouni (Saudi Arabian National Center for Science and Technology, Riyadh), Z. M. N. Munshi (Saudi Arabian National Center for Science and Technology, Riyadh), and P. S. Chavez, Jr. *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 7 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

The primary objectives of the investigation are to determine fully the utility of Shuttle Imaging Radar-B (SIR-B) images for providing valuable surface indicators for ground-water prospecting in the Arabian shield and to identify and assess defining characteristics of sand sheets, sand streaks, and sand dunes in the fringe areas of An Nafud and Al Jafurah. Specific objectives include the determination of the incremental contribution of incidence angle to the total information that can be extracted from SIR-B standard and digitally-enhanced images in the AL Jafurah fringe area; the determination of the incremental contribution of digitally-registered multisensor images; and the development of a groundwater exploration plan for the Ha'il test area in the Arabian Shield.R.J.F.

N85-17215*# Cornell Univ., Ithaca, N.Y.
TECTONIC, VOLCANIC, AND CLIMATIC GEOMORPHOLOGY STUDY OF THE SIERRAS PAMPEANAS ANDES, NORTHWESTERN ARGENTINA
A. L. Bloom, M. R. Strecker, and E. J. Fielding *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

A proposed analysis of Shuttle Imaging Radar-B (SIR-B) data extends current research in the Sierras Pampeanas and the Puna of northwestern Argentina to the determination - by the digital analysis of mountain-front sinuousity - of the relative age and amount of fault movement along mountain fronts of the late-Cenozoic Sierras Pampeanas basement blocks; the determination of the age and history of the boundary across the Andes at about 27 S latitude between continuing volcanism to the north and inactive volcanism to the south; and the determination of the age and extent of Pleistocene glaciation in the High Sierras, as well as the comparative importance of climatic change and tectonic movements in shaping the landscape. The integration of these studies into other ongoing geology projects contributes to the understanding of landform development in this active tectonic environment and helps distinguish between climatic and tectonic effects on landforms. R.J.F.

N85-17216*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DEFORESTATION, FLOODPLAIN DYNAMICS, AND CARBON BIOGEOCHEMISTRY IN THE AMAZON BASIN
M. L. Bryan, T. Dunne (Washington Univ., Seattle), J. Richey (Washington Univ., Seattle), J. Melack (California Univ., Santa Barbara), D. Simonett (California Univ., Santa Barbara), and G. Woodwell (Marine Biological Lab., Woods Hole, Mass.) *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 7 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

Three aspects of the physical geographic environment of the Amazon Basin are considered: (1) deforestation and reforestation, (2) floodplain dynamics, and (3) fluvial geomorphology. Three independent projects are coupled in this experiment to improve the in-place research and to ensure that the Shuttle Imaging Radar-B (SIR-B) experiment stands on a secure base of ongoing work. Major benefits to be obtained center on: (1) areal and locational information, (2) data from various depression angles, and (3) digital radar signatures. Analysis will be conducted for selected sites to define how well SIR-B data can be used for: (1) definition of extent and location of deforestation in a tropical moist forest, (2) definition and quantification of the nature of the vegetation and edaphic conditions on the (floodplain) of the Amazon River, and (3) quantification of the accuracy with which the geometry and channel shifting of the Amazon River may be mapped using SIR-B imagery in conjunction with other remote sensing data. R.J.F.

N85-17217*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SOUTHERN OCEAN SEA-ICE MORPHOLOGY AND KINEMATICS
F. Carsey, B. Holt, S. Martin (Washington Univ., Seattle), D. A. Rothrock (Washington Univ., Seattle), W. F. Weeks (Army Cold Regions Research and Engineering Lab., Hanover, N.H.), and V. Squire (Scott Polar Research Inst.) *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 2 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

A pilot satellite experiment is described which would employ shuttle imaging radar (SIR) to determine the applicability of imaging radar for the description of sea ice type and movement. The experimental objectives, design, and anticipated results are discussed. The results are expected to constitute an important contribution to the understanding of the role of sea ice in air-sea interactions in polar regions. It is proposed that shuttle photography, thematic mapper imagery, and SIR data be utilized in this remote sensing project. R.S.F.

N85-17218*# Department of Scientific and Industrial Research, Lower Hutt (New Zealand).
NEW ZEALAND SIR-B SCIENCE INVESTIGATIONS
M. A. Collins, P. J. Oliver, G. R. Cochrane (Auckland Univ.), J. Cole (Victoria Univ., Wellington, New Zealand), D. S. Coombs (Otago Univ.), E. J. Barnes, N. P. Ching (New Zealand Forest Service, Wellington), R. L. Bennets (Ministry of Agriculture and Fisheries, Darfield, New Zealand), P. H. Stephens (Ministry of Works and Development, Palmerston North, New Zealand), A. K. Laing (New Zealand Meteorological Services, Wellington) et al *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary

document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

It is proposed that shuttle imaging radar (SIR) data be used to study unusual geological features of New Zealand. Particular attention is planned for geological faults. SIR-B imagery is to be compared with LANDSAT multispectral imagery. Three other investigations which are to use SIR data are discussed. An ocean eddy is to be studied from a correlation of SIR-B and advanced very high resolution radiometer imagery. Timber volume is to be assessed by determining the age and size of pine forests from SIR-B data. Soil moisture is to be investigated by comparing SIR-B data with simultaneous gravimetric data. Land cover in a region already subjected to intensive investigation using LANDSAT and aircraft scanner data is to be discriminated by SIR-B data. R.S.F.

N85-17219*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SIR-B ANALYSIS OF THE PRECAMBRIAN SHIELD OF SUDAN AND EGYPT: PENETRATION STUDIES AND SUBSURFACE MAPPING
T. H. Dixon, L. Roth, R. J. Stern (Texas Univ. at Dallas, Richardson), D. C. Almond (Khartoum Univ.), A. Kroner (Mainz Univ., West Germany), and E. M. ElShazly (Atomic Energy Establishment, Cairo) *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 2 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

A shuttle imaging radar-B (SIR-B) study is proposed for the Precambrian shield in southeast Egypt and northeast Sudan in an area east of the Nile. The phenomenon of radar penetration of thin, dry eolian/alluvial cover is to be confirmed and quantified. The penetration phenomenon is to be used to map structural and lithologic features. Field work to be done in conjunction with image acquisition is discussed. R.S.F.

N85-17220*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
QUANTITATIVE USE OF MULTIINCIDENCE-ANGLE SAR FOR GEOLOGIC MAPPING
T. G. Farr, A. L. Albee, D. L. Evans, J. E. Solomon, M. I. Daily (Mobil Field Research Lab., Dallas), T. C. Labotka (Tennessee Univ., Knoxville), and M. O. Smith (Washington Univ., Seattle) *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 6 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

It is proposed that techniques be developed and used for quantitative interpretation of shuttle imaging radar-B (SIR-B) data for lithologic identification and mapping. The use of backscatter versus incidence angle signatures derived from SIR-B images is to be investigated. The use of SIR-B with other sensors for geologic mapping is also to be considered. Anticipated results are discussed in terms of geologic mapping. R.S.F.

N85-17221*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GEOLOGIC MAPPING OF INDONESIAN RAIN FOREST WITH ANALYSIS OF MULTIPLE SIR-B INCIDENCE ANGLES
J. P. Ford, F. F. Sabins, Jr. (Chevron Oil Field Research Co., La Habra, Calif.), and P. Asmoro, Jr. (National Coordinating Agency for Survey and Mapping, Cibinong-Bogor, Indonesia) *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

The discrimination and mapping capabilities are to be evaluated for shuttle imaging radar-B (SIR-B) images of geologic features in Indonesia that are covered by equatorial rain forest canopy. The SIR-B backscatter from the rain forest at L-band is to be compared to backscatter acquired by the SEASAT scatterometer system at Ku-band ever corresponding areas. The approach for data acquisition, handling, and analysis and the expected results of the investigation are discussed. R.S.F.

N85-17222*# Radio Research Labs., Tokyo (Japan).
REMOTE SENSING OF RICE FIELDS AND SEA POLLUTION BY SIR-B c43
N. Fugono, Y. Furuhama, T. Takasugi, K. Okamoto, M. Fujita, S. Yoshikado, H. Masuko, T. Shinozuka, H. Inomata, and I. Shiro *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

Sensor calibration, rice fields, and sea pollution are to be investigated with respect to shuttle imaging radar-B (SIR-B). It is planned that the resolution characteristics of the SIR-B be evaluated, the sidelobe characteristics of the SIR-B be investigated, and the relationship between backscatter cross section and image intensity be established. The microwave-scattering characteristics of rice fields are to be studied using SIR-B data. The possibility of classifying crops from SIR-B data is to be explored. The characteristics of the radar image of oil-like surface films under several sea surface conditions are to be determined. The absolute measurement capability of the sea surface scattering cross section is to be estimated using the SIR. R.S.F.

N85-17223*# Earth Satellite Corp., Chevy Chase, Md.
EVALUATION OF SIR-B DATA FOR IDENTIFYING RAINFALL EVENT OCCURRENCE AND INTENSITY c47
D. Garofalo, J. N. Cooper, J. R. Everett, L. J. Warnick, L. H. Wynn, C. Sheffield, M. Ruth, R. Perrine, and K. Estep *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 2 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 04B

The utility of shuttle imaging radar-B (SIR-B) data for the detection and measurement of rainfall events is to be investigated. The investigation is described along with the approach for data acquisition, handling, and analysis. Anticipated results are also considered. The CROPCAST rainfall estimation technique is discussed. R.S.F.

N85-17224*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SIR-B INTERFEROMETRIC TOPOGRAPHY c43
R. M. Goldstein and F. K. Li *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 2 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 05B

An interferometric method of using the shuttle imaging radar-B (SIR-B) data for high resolution elevation measurements is to be developed. It is proposed that signals from separate SIR-B passes be combined to provide the equivalent of an interferometer. Data acquisition and handling are considered along with expected results. R.S.F.

N85-17225*# Canada Centre for Remote Sensing, Ottawa (Ontario).
USE OF SIR-B MULTIINCIDENCE-ANGLE IMAGERY TO STUDY ICEBERG DETECTABILITY AND OFFSHORE OCEAN FEATURE EXTRACTION c43
A. L. Gray, J. Princz, C. E. Livingstone, R. K. Hawkins, M. Wong, D. Pearson (Petro-Canada Exploration, Inc., Calgary, Alberta), J. Gower (Inst. of Ocean Sciences, Sydney, British Columbia), T. F. Mullane (Atmospheric Environment Service, Ottawa), and R. O. Ramseier (Atmospheric Environment Service, Ottawa) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08L

The Shuttle Imaging Radar B (SIR-B) iceberg experiment is described and expected results are outlined. The specific objectives are: (1) to study the L-band satellite SAR detectability of iceberg targets as a function of incidence angle and observed conditions; (2) to compare L-, X-, and C-band aircraft imagery, and to use this data as a basis for an appropriate simulation of satellite imagery and to compare with SIR-B images; and (3) to determine the possibility of comparive available surface or near surface currents with estimates of the range component of surface current derived from the SIR-B data (IOS experiment). M.G.

N85-17226*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

GEOLOGICAL, STRUCTURAL, AND GEOMORPHOLOGICAL ANALYSES FROM SIR-B **c46**

J. W. Head, III, P. J. Mouginis-Mark (Hawaii Univ., Honolulu), S. H. Zisk (Haystack Observatory, Westford, Mass.), R. A. F. Grieve, A. R. Peterfreund, and K. D. Sullivan *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 6 p refs Prepared in cooperation with Brown Univ., Providence, R.I. (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 08G

A Shuttle Imaging Radar-B (SIR-B) study designed to develop a better understanding of the application of radar in geological studies is described. The specific objectives for deltaic environments include the examination of delta morphology and the intertidal zone, the surface expression of shallow bathymetry, the characterization of vegetation cover, and the water balance of the delta. In impact crater environments, the goals include the establishment of the radar characteristics of exposed craters and the application of this knowledge to test for the detectability of very poorly exposed craters. M.G.

N85-17227*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

AMPLITUDE CALIBRATION EXPERIMENT FOR SIR-B

D. N. Held and F. T. Ulaby (Kansas Univ. Center for Research, Inc., Lawrence) *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 17I

The objectives, approach, and expected results of the amplitude calibration experiment for the Shuttle Imaging Radar-B (SIR-B) are outlined. Specific objectives include: (1) the determination of the repeatability (stability) of the SIR-B; (2) the absolute and relative calibration of the system; and (3) the ground truth verification of the calibration accuracy using measurements made by a ground spectrometer and an airborne synthetic aperture radar. M.G.

N85-17228*# Purdue Univ., Lafayette, Ind.

MICROWAVE AND OPTICAL REMOTE SENSING OF FOREST VEGETATION **c43**

R. M. Hoffer, M. E. Bauer, L. L. Biehl, and R. P. Mroczynski *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 02F

The objectives and anticipated results of a study to define the strengths and limitations of microwave (SIR-B) and optical (thematic Mapper) data, singly and in combination, for the purpose of characterizing forest cover types and condition classes are described. Other specific objectives include: (1) the assessment of the effectiveness of a contextual classification algorithm (SECHO); (2) evaluation of the utility of different look angles of SAR data in determining differences in stand density of commercial forests; and (3) the determination of the effectiveness of the L-band HH polarized SIR-B data in differentiating forest-stand densities. M.G.

N85-17229*# Commonwealth Scientific and Industrial Research Organization, Wembley (Australia).

EVALUATION OF SIR-B IMAGERY FOR GEOLOGIC AND GEOMORPHIC MAPPING, HYDROLOGY, AND OCEANOGRAPHY IN AUSTRALIA **c46**

F. R. Honey, C. J. Simpson (Bureau of Mineral Resources, Canberra, Australia), J. Huntington, R. Horwitz, G. Byrne, and C. Nilsson *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 17G

The objectives of a study to evaluate the potential of Shuttle Imaging Radar-B (SIR-B) imagery for various applications are outlined. Specific goals include: the development of techniques for registration multiple acquisition, varied illumination, and incidence-angle SIR-B imagery, and a model for estimation of the relative contributions to the backscattered radiation of topography, surface roughness, and dielectric and conductivity components; (2) the evaluation of SIR-B imagery for delineation of agricultural lands affected by secondary salinity in the southwest and southeast agricultural regions of Australia; (3) the development of techniques for application of SIR-B imagery for geologic, geomorphologic and soils mapping and mineral exploration; and (4) the evaluation of the use of SIR-B imagery in determining ocean currents, current shear patterns, internal waves and bottom features for specific locations off the Australian coast. M.G.

N85-17230*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

THE USE OF DIGITAL SPACEBORNE SAR DATA FOR THE DELINEATION OF SURFACE FEATURES INDICATIVE OF MALARIA VECTOR BREEDING HABITATS **c51**

M. L. Imhoff, C. H. Vermillion, and F. A. Khan (Space Research and Remote Sensing Organization, Dacca, Bangaladesh) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p ref (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 06C

An investigation to examine the utility of spaceborne radar image data to malaria vector control programs is described. Specific tasks involve an analysis of radar illumination geometry vs information content, the synergy of radar and multispectral data mergers, and automated information extraction techniques. M.G.

N85-17231*# Illinois Univ., Urbana.

INTERLOBATE COMPARISON OF GLACIAL-DEPOSITIONAL STYLE AS EVIDENCED BY SMALL-RELIEF GLACIAL LANDSCAPE FEATURES IN ILLINOIS, INDIANA, AND OHIO, UTILIZING SIR-B **c43**

W. H. Johnson, N. K. Bleuer (Geological Survey, Bloomington, Ind.), G. S. Fraser (Geological Survey, Bloomington, Ind.), and S. M. Totten (Hanover Coll., Ind.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 08L

The objectives and expected results of an investigation of the use of the Shuttle Imaging Radar-B (SIR-B) as a basic tool in the recognition and mapping of glacial landforms are discussed. The main goals are: (1) to evaluate the ability of SIR-B to delineate varying sizes, shapes, and relief of surface forms; (2) to compare and contrast SIR-B imagery with selected Seasat SAR imagery; (3) to utilize SIR-B imagery synergistically with available SEASAT SAR, LANDSAT RBV, and other imagery sources to identify and map suites of glacial landforms; and (4) eventually to interpret the suites in terms of ice dynamics and conditions of deglaciation, to relate them to the stratigraphic record, and to evaluate interactions of the major lobes and sublobes. M.G.

N85-17232*# Arkansas Univ., Fayetteville.

EVALUATION OF THE L-BAND SCATTERING CHARACTERISTICS OF VOLCANIC TERRAIN IN AID OF LITHOLOGIC IDENTIFICATION, ASSESSMENT OF SIR-B CALIBRATION, AND DEVELOPMENT OF PLANETARY GEOMORPHIC ANALOGS **c46**

V. H. Kaupp, W. P. Waite, H. C. MacDonald, P. J. Mouginis-Mark (Hawaii Univ., Honolulu), and S. H. Zisk (Haystack Observatory, Westford, Mass.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 08K

The objectives of the Shuttle Imaging Radar-B (SIR-B) scattering study and calibration investigation of volcanic terrain are to delineate textural and structural features, to evaluate the L-band scattering characteristics, and to assess SIR-B calibration. Specific tasks are outlined and expected results are summarized. M.G.

N85-17233*# Royal Aircraft Establishment, Farnborough (England).

THE INVESTIGATION OF SELECTED OCEANOGRAPHIC APPLICATIONS OF SPACEBORNE SYNTHETIC-APERTURE RADAR **c48**

G. E. Keyte, B. C. Barber, M. B. Barnes, G. C. White, M. Bagg (Admiralty Underwater Weapons Establishment), B. dOlier (City of London Polytechnic), and N. Lynn (Royal Naval Coll.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 6 p (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 08C

Synthetic aperture radar images obtained from Seasat and SIR-A showed that a number of oceanographic features were imaged in considerable detail, like internal waves, large ocean waves, bathymetric features, eddies, and slicks. the imaging mechanisms however, are not well understood, and for both SEASAT and SIR-A there are few supporting sea surface measurements to assist in the study of these imaging mechanisms. The SIR-B will conduct three separate experiments to provide a better understanding of the use of spaceborne SAR for imaging: (1) internal waves; (2) ocean surface waves, and (3) shallow water bathymetry. These experiments are chosen because they lead to possible applications for microwave remote sensing of the ocean surface and give a better understanding of the microwave/sea surface imaging mechanism. E.A.K.

N85-17234*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

SIR-B CARTOGRAPHY AND STEREO TOPOGRAPHIC MAPPING c43

M. Kobrick, F. Leberl (Inst. for Image Processing and Computer Graphics), J. Raggam (Image Processing and Computer Graphics), G. Domik (Image Processing and Computer Graphics), R. Welch (Georgia Univ., Athens), H. Carr (Naval Observatory, Washington, D.C.), J. Hammak (Naval Observatory, Washington, D.C.), V. Kaupp (Arkansas Univ., Fayetteville), H. C. MacDonald (Arkansas Univ, Fayetteville), W. P. Waite (Arkansas Univ., Fayetteville) et al *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 08B

The SIR-B mapping experiment which will evaluate the utility of SAR images taken singularly, in pairs, and in combination with other data sets for cartographic, topographic, and thematic mapping, and determine the optimum configuration of a SAR system for future mapping mission is outlined. SIR-B is the first orbital imaging radar mission which will incorporate maintenance of geometric image fidelity along with careful calibration and documentation of internal timing and frequency parameters. This along and and the multiple incidence angle images of the same target which are necessary for stereoscopy and topographic mapping, make it the ideal opportunity for cartographic experimentation. It is emphasized that comprises a significant part of the overall experiment objectives. E.A.K.

N85-17235*# International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).

MONITORING OF THE TIDAL DYNAMICS OF THE DUTCH WADDENSEA BY SIR-B c48

B. N. Koopmans, D. vanderZee, A. Th. Verstappen, T. Woldai, and H. Hoschititzky *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 08C

The potential of LANDSAT data, covering the entire tidal flats at a certain, known, tidal situation, was assessed. It was discovered that the data cannot be used for systematic survey because of the long interval between subsequent passes, weather conditions often interfere with recording, and of the lack of correlation between passes and the tidal situation. The objective is to overcome the problems by using: (1) the synoptic view obtained by SIR-B, which has the potential of surveying large areas of the flats simultaneously; (2) the all-weather capability of the microwave system; (3) the recording during consecutive days, which results in a straightforeward correlation with the tidal cycle and the picturing of different tidal stages; and (4) the multiangle incidence of SIR-B to analyze the bottom configuration of submerged parts of the flats. The use of a weather independent monitoring device, such as radar, an improvement in the monitoring technique of tidal coastal areas. E.A.K.

N85-17236*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

STRUCTURAL INVESTIGATION OF THE CANADIAN SHIELD BY ORBITAL RADAR AND LANDSAT c46

P. D. Lowman, Jr., H. W. Blodget, W. J. Webster, Jr., S. Paia (Ontario Centre for Remote Sensing), V. H. Singhroy (Ontario Centre for Remote Sensing), and V. R. Slaney (RADARSAT Project Office) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 08G

Canadian Shield were studied by orbital radar. The primary objective of the study is scientific: to investigate and clarify the tectonic relationships of the Churchill, Superior, and Grenville Provinces, concentrating on their geologic boundaries, the Nelson and Grenvill Fronts. Theories about its origin range from in-situ regional metamorphism to tectonic sutures resulting from terrain accretion. The SIR-B investigation clarifies this problem. Secondary objectives are technique development, and include: (1) evaluation of the use of orbital radar in high altitude Precambrian terrains; (2) evaluation of look-azimuth biasing in radar and LANDSAT imagery; and (3) investigation of the synergistic use of radar, LANDSAT, and geophysical data in Precambrian studies. E.A.K.

N85-17237*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

STRUCTURAL INVESTIGATION OF THE GRENVILLE PROVINCE BY RADAR AND OTHER IMAGING AND NONIMAGING SENSORS

P. D. Lowman, Jr., H. W. Blodget, W. J. Webster, Jr., S. Paia (Ontario Centre for Remote Sensing), V. H. Singhroy (Ontario Centre for Remote Sensing), and V. R. Slaney (RADARSAT Project Office) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32).

Avail: NTIS HC A10/MF A01 CSCL 17I

The structural investigation of the Canadian Shield by orbital radar and LANDSAT, is outlined. The area includes parts of the central metasedimentary belt and the Ontario gneiss belt, and major structures as well-expressed topographically. The primary objective is to apply SIR-B data to the mapping of this key part of the Grenville orogen, specifically ductile fold structures and associated features, and igneous, metamorphic, and sedimentary rock (including glacial and recent sediments). Secondary objectives are to support the Canadian RADARSAT project by evaluating the baseline parameters of a Canadian imaging radar satellite planned for late in the decade. The baseline parameters include optimum incidence and azimuth angles. The experiment is to develop techniques for the use of multiple data sets. E.A.K.

N85-17238*# Kansas Univ. Center for Research, Inc., Lawrence.

STUDIES OF COASTAL MESOSCALE WINDS USING SIR-B c47

R. K. Moore and W. J. Pierson (City Univ. of New York) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 04B

The variability of the mesoscale wind fields near coastlines which can be caused by mountains that shadow offshore wind and by valleys that enhance them. These wind, provide relatively fixed patterns that must be considered in the development of algorithms for future spaceborne scatterometer systems; mesoscale variability over the offshore regions is random and must be averaged out for forecasting yet nearshore fixed patterns are treated differently. Before the patterns of interest can be defined quantitatively, the scattering response of the ocean to winds at the L-band frequency and SIR-B angles of incidence must be developed from the SIR-B data. Patterns can be analyzed on the images both in regions selected for high probability of the occurrence of suitable patterns, and in other regions where the patterns are observed. The patterns are analyzed for topographic effects and the distance to sea over which these effects cause variations in the oceanic wind patterns. The results are interpreted in terms of quantitative description of the processes involved and in for need of modifications of future scatterometer algorithms. E.A.K.

N85-17239*# Kansas Univ. Center for Research, Inc., Lawrence.

INFORMATION FOR SPACE RADAR DESIGNERS: REQUIRED

DYNAMIC RANGE VS RESOLUTION AND ANTENNA CALIBRATION USING THE AMAZON RAIN FOREST c43

R. K. Moore and V. S. Frost *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1985 3 p refs (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 02F

Calibration of the vertical pattern of the antennas for the SEASAT scatterometer was accomplished using the nearly-uniform radar return from the Amazon rain forest. A similar calibration will be attempted for the SIR-B antenna. Thick calibration is important to establish the radiometric calibration across the swath of the SIR-B, and the developed methodology will provide an important tool in the evaluation of future spaceborne imaging radars. This calibration was made by the very-wide-beam SEASAT scatterometer antennas because at 14.65 GHz the scattering coefficient of the rain forest is almost independent of angle of incidence. It is expected that the variation in scattering coefficient for the rain forest across the relatively narrow vertical beam of the SIR-B will be very small; even at L band the forest should be essentially impenetrable for radar signals, the volume scatter from the treetops will predominate as at higher frequencies. The basic research elements include: (1) examination of SIR-B images over the rain forest to establish the variability of the scattering coefficient at finer resolutions than that of the SEASAT scatterometer; (2) analysis of the variability of SIR-B data detected prior to processing for either azimuth compression or; possibly, range compression so that averages over relatively large footprints can be used; (3) processing of data of the form of (2) using algorithms that can recover the vertical pattern of the antenna. E.A.K.

N85-17240*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

DEVELOPMENT AND EVALUATION OF TECHNIQUES FOR USING COMBINED MICROWAVE AND OPTICAL IMAGE DATA FOR VEGETATION STUDIES c43

J. F. Paris, B. N. Rock, and S. Y. Hsu (Susquehanna Resource and Environment, Inc.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 02F

Techniques for using combined image data from the Shuttle Imaging Radar (SIR-B) and the LANDSAT Thematic Mapper (TM) or Multispectral Scanner (MSS) for studies of irrigated crops, and boreal and deciduous forests are developed and evaluated. The effects of the structure and composition of crop canopies and soil surfaces on multiangle L-band HH (Horizontal polarization for transmission and reception) backscattering and on optical reflectance (in TM or MSS bands viewed at the nadir) are investigated. The relative accuracy of digital, calibrated SIR-B image data and LANDSAT TM or MSS image data is evaluated. Textural information extraction-techniques are developed for radar and optical image analysis. B.W.

N85-17241*# Analytic Sciences Corp., Reading, Mass.

INVESTIGATION OF SIR-B IMAGES FOR LITHOLOGIC MAPPING c43

J. T. Parr and R. V. Sailor *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 2 p ref (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 08B

It is immediately apparent from the examination of almost any synthetic aperture radar (SAR) data that the radar return is primarily a function of the topographic relief. Yet radar reflectance is dependent on both surface roughness and the dielectric constant of the surface material. These two parameters can in many cases be related to lithologic units. Thus, if the first-order terrain effects due to topographic relief could (in essence) be removed from the radar image, the SAR data might well be used for lithologic discrimination. Such an approach is evaluated. Landsat Thematic Mapper data along with ground truth are used to define training cells that characterize the various lithologic units in the area. By aggregating the radar data for these cells, curves of radar reflectance versus local incidence are estimated. The curves are then used to classify the test area. The results are compared with lithologic classification based upon multi-spectral (visible and infrared) data. B.W.

N85-17242*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

AUTOMATIC TERRAIN ELEVATION MAPPING AND REGISTRATION c43

H. K. Ramapriyan, C. W. Murray, J. P. Strong, and H. W. Blodget *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 08B

Optimum radar illumination geometries for stereoscopic analysis of surface topography are determined. Correlation and image processing experiments on synthetic aperture radar (SAR) data for improved information extraction are conducted. Model of the geometry of the multiple SIR-B views of the Earth are developed the sensitivity of the derived terrain altitude data to the various system parameters is established. The limits of accuracy of terrain data achievable with shuttle imaging radar (SIR-B) are derived. Algorithms for matching multiple SIR-B images to generate digital terrain maps are developed. Finally, the use of such terrain maps in geometric correction and registration of SIR-B and LANDSAT Thematic Mapper data is demonstrated. B.W.

N85-17243*# New South Wales Univ., Kensington (Australia).

AUSTRALIAN MULTIEXPERIMENTAL ASSESSMENT OF SIR-B (AMAS)

J. A. Richards, B. C. Forster, A. K. Milne, G. R. Taylor, and J. C. Trinder *In its* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 17I

The utility of SIR-B data for analysis of surface properties and subsurface morphology in three arid regions of Australia is investigated. This study area is located in western New South Wales. It contains extensive aeolian and alluvially derived depositional plains and is the site of the University's Arid Zone Research Station; it is well-mapped and surveyed. Radar backscatter is mapped and evaluated against known terrain conditions. Relative components of surface and subsurface return are determined with a view to indentifying structural properties of surface and subsurface morphology. The capability of microwave remote sensing in locating likely groundwater sources in the Bancannia Basin, near Fowler's Gap is assessed. B.W.

N85-17244*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

APPLICATION AND CALIBRATION OF THE SUBSURFACE MAPPING CAPABILITY OF SIR-B IN DESERT REGIONS c43

G. G. Schaber, J. F. McCauley, C. S. Breed, M. J. Grolier, B. Issawi (Egyptian Geological Survey and Mining Authority), C. V. Haynes (Arizona Univ., Tucson), W. McHugh (GAI Consultants), A. S. Walker (Geological Survey, Reston, Va.), and R. Blom *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 5 p refs Prepared in cooperation with Geological Survey, Flagstaff, Ariz. (For primary document see N85-17208 08-32)

Avail: NTIS HC A10/MF A01 CSCL 08B

The penetration capability of the shuttle imaging radar (SIR-B) sensor in desert regions is investigated. Refined models to explain this penetration capability in terms of radar physics and regional geologic conditions are devised. The sand-buried radar-rivers discovered in the Western Desert in Egypt and Sudan are defined. Results and procedures developed during previous SIR-A investigation of the same area are extrapolated. Author

N85-17245*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Freiburg (West Germany).

GERMAN RADAR OBSERVATION SHUTTLE EXPERIMENT (ROSE)

A. J. Sieber, Ph. Hartl (Stuttgart Univ.), R. Haydn (Ludwig-Maximilians Univ.), G. Hildebrandt (Freiburg Univ.), G. Konecny (Technische Univ., Hannover, West Germany), and R. Muehlfeld (Federal Inst. for Geoscience and Natural Resources) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 2 p (For primary document

see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

The success of radar sensors in several different application areas of interest depends on the knowledge of the backscatter of radar waves from the targets of interest, the variance of these interaction mechanisms with respect to changing measurement parameters, and the determination of the influence of he measuring systems on the results. The incidence-angle dependency of the radar cross section of different natural targets is derived. Problems involved by the combination of data gained with different sensors, e.g., MSS-, TM-, SPOTand SAR-images are analyzed. Radar cross-section values gained with ground-based radar spectrometers and spaceborne radar imaging, and non-imaging scatterometers and spaceborne radar images from the same areal target are correlated. The penetration of L-band radar waves into vegetated and nonvegetated surfaces is analyzed. Author

N85-17246*# California Univ., Santa Barbara.
THE EXTENSION OF AN INVERTIBLE CONIFEROUS FOREST CANOPY REFLECTANCE MODEL USING SIR-B AND LANDSAT DATA **c43**
D. S. Simonett and A. H. Strahler (City Univ. of New York) *In* JPL The SIR-B Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 02F

Using a 23-cm radar system, an invertible coniferous canopy reflectance model is extended. The extension involves the joint use of shuttle imaging radar (SIR-B) multilook angle data, the multispectral scanner (MSS), and the thematic mapper (TM) on LANDSAT. B.W.

N85-17247*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AN INVESTIGATION OF IONOSPHERIC IRREGULARITY EFFECTS ON SIR-B IMAGE PROCESSING AND INFORMATION EXTRACTION **c46**
E. P. Szuszczewicz (Naval Research Lab., Washington, D.C.), M. A. Abdu (Inst. de Pesquisas Espaciais, Sao Paulo, Brazil), J. H. A. Sobral (Inst. de Pesquisas Espaciais, Sao Paulo, Brazil), J. Jost, B. M. Reddy (National Physical Lab., New Delhi, India), C. Rino (Stanford Research Inst., Menlo Park, Calif.), T. Robinson (Leicester Univ.), P. Rodrigues (Naval Research Lab., Washington, D.C.), M. Singh (Sachs/Freeman Associates, Inc., Bowie, Md.), and R. Woodman (Inst. Geofisico del Peru, Lima) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 04A

Ionospheric irregularities and associated effects on space-time synthetic aperture radar (SAR) image processing and information extraction, including sensor calibration, target statistics determination, resolution, distortion, and overall image integrity were investigated. B.G.

N85-17248*# Nevada Univ., Reno.
ANALYSIS OF SIR-B RADAR ILLUMINATION OF GEOMETRY FOR DEPTH OF PENETRATION AND SURFACE FEATURE AND VEGETATION DETECTION, NEVADA AND CALIFORNIA **c43**
J. V. Taranik, D. B. Slemmons, E. J. Bell, M. Borengasser, T. P. Lugaski, H. Vreeland, P. Vreeland, E. Kleiner, F. F. Peterson, and H. Kleiforth *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 02F

The measurement capability provided by the Shuttle Imaging Radar (SIR-B) was used to determine: (1) the relationships between radar illumination geometry and depth of penetration in different climatic and physiographic environments in Nevada; and, (2) the relationships between radar illumination geometry and detection and analysis of structural features in different climatic and physiographic environments in Nevada. B.G.

N85-17249*# Massachusetts Inst. of Tech., Cambridge.
DELINEATION OF MAJOR GEOLOGIC STRUCTURES IN TURKEY USING SIR-B DATA **c46**
M. N. Toksoz, G. H. Pettengill, P. Ford, and L. Gulen *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08G

Shuttle Imaging Radar-B (SIR-B) images of well mapped segments of major faults, such as the North Anatolian Fault (NAF) and East Anatolian Fault (EAF) will be studied to identify the prominent signatures that characterize the fault zones for those specific regions. The information will be used to delineate the unmapped fault zones in areas with similar geological and geomorphological properties. The data obtained from SIR-B images will be compared and correlated with the LANDSAT thematic mapper and seismicity alignments based on well constrained earthquake epicenters. B.G.

N85-17250*# Kansas Univ. Center for Research, Inc., Lawrence.
EVALUATION OF THE RADAR RESPONSE TO LAND SURFACES AND VOLUMES: EXAMINATION OF THEORETICAL MODELS, TARGET STATISTICS, AND APPLICATIONS
F. T. Ulaby, A. K. Fung, M. C. Dobson, and J. Cihlar (Canada Centre for Remote Sensing, Ottawa) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

Four areas of L-band radar remote sensing of terrain were examined: (1) the behavior of the radar backscatter coefficient of distributed surface and volumes as a function of the targets' dielectric and geometric parameters and as a fnction of their physical parameters; (2) the correspondence of the angular behavior of the relative backscatter coefficient as extracted from SIR-B digital imagery and truck mounted L-band scatterometer measurements for about 100 fields; (3) the statistical behavior of SIR-B image density for targets that appear homogeneous on Thematic Mapper (TM) optical imagery and/or color IR photography; and (4) the applicability of SIR-B imagery both alone and in conjunction with TM imagery for the classification and monitoring of land cover and renewable resources. B.G.

N85-17251*# Lund Technical Univ. (Sweden).
GROUND TRUTH FOR SIR-B IMAGES OBTAINED BY SIR SYSTEM 8 IMPULSE RADAR
P. Ulriksen, H. Ottersten (Research Inst. of National Defence), C. G. Borg (Swedish Space Corp., Solna), S. Axelsson (Saab-Scania, Linkoeping), and B. Ekengren (Ericsson Radio System) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

Verification of suspected penetration by means of three dimensional information on the features in the SIR-B images will be investigated. The Great Alvar is a well documented area, especially in geology and ecology, and should provide a good opportunity to evaluate the data. B.G.

N85-17252*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REMOTE SENSING OF SOIL MOISTURE **c43**
J. R. Wang, J. C. Shiue, T. J. Schmugge, P. Cuddapah, T. J. Jackson (Dept. of Agriculture, Beltsville, Md.), and T. Mo (Computer Sciences Corp., Silver Spring, Md.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08M

Four major objectives are proposed: (1) to study the sensitivity of active and passive microwave remote sensing approaches to soil moisture variations; (2) to investigate the effect of vegetation cover on microwave backscatter and emission; (3) to test theoretical models of microwave backscatter and emission from a natural terrain against the observations obtained from SIR-B and aircraft radiometer flights; and (4) to estimate vegetation biomass with airborne visible and infrared sensors. B.G.

N85-17253*# Office of Naval Research, Arlington, Va.
SAR INTERNAL WAVE SIGNATURE EXPERIMENT **c48**

R. S. Winokur, J. R. Apel (APL, Laurel, Md.), and R. F. Gasparovic (APL, Laurel, Md.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08C

Internal wave and surface wave observations by research vessels will be conducted in conjunction with aircraft SAR images. Synthetic Aperture Radar Internal Wave Signature Experiment (SARSEX) provides an opportunity to acquire aircraft and spacecraft SAR imagery of internal waves with appropriate sea truth data. Objectives are to investigate basic mechanisms (both hydrodynamic and electromagnetic) responsible for internal wave signatures and quantitatively test theories and models for predicting internal wave signatures from given ocean and radar parameters. B.G.

N85-17254*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DATA USER'S MANUAL **c61**
In its The SIR-B Sci. Invest. Plan 1 Jul. 1984 7 p ref (For primary document see N85-17208 08-32)
Avail: NTIS. HC A10/MF A01 CSCL 09B

The standard SIR-B data products will consist of both optical and digital output. The format of the unprocessed echo data, optically processed image data, and digital image data is described. B.G.

N85-17255*# National Aeronautics and Space Administration, Washington, D. C.
PROBLEMS RELEVANT TO TOWN INCOMING RADIO TV LINKS
L. Tomati Nov. 1984 18 p refs Transl. into ENGLISH from Elettronica e Telecommun. (Italy), no. 5, 1978 p 209-213 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77623; NAS 1.15:77623) Avail: NTIS HC A02/MF A01 CSCL 17B

The degradations produced on the wanted TV signal by an interfering signal are examined. The TV protection ratios to be respected are also examined in case of co-channel interference and adjacent channels. Problems related to the possible disturbances produced by the interfering signal on the AGC and the squelch of the interred receiver are also taken into account. Some solutions normally adopted for the above problems are examined, including improvement of the antenna directivity, suitable filtering, and polarization discrimination. Finally, some problems related to the propagation I urban areas for what concerns the possible distortions on a color TV signal are examined. Author

N85-17256*# Kansas Univ. Center for Research, Inc., Lawrence. Telecommunications and Information Sciences Lab.
INFORMATION EXTRACTION AND TRANSMISSION TECHNIQUES FOR SPACEBORNE SYNTHETIC APERTURE RADAR IMAGES Final Technical Report
Victor S. Frost, L. Yurovsky, E. Watson, K. Townsend, S. Gardner, D. Boberg, J. Watson, G. J. Minden, and K. S. Shanmugan Dec. 1984 274 p refs
(Grant NAGw-381)
(NASA-CR-174341; NAS 1.26:174341; FTR-596-5) Avail: NTIS HC A12/MF A01 CSCL 17I

Information extraction and transmission techniques for synthetic aperture radar (SAR) imagery were investigated. Four interrelated problems were addressed. An optimal tonal SAR image classification algorithm was developed and evaluated. A data compression technique was developed for SAR imagery which is simple and provides a 5:1 compression with acceptable image quality. An optimal textural edge detector was developed. Several SAR image enhancement algorithms have been proposed. The effectiveness of each algorithm was compared quantitatively. Author

N85-17257*# Hawaii Univ., Manoa. Dept. of Electrical Engineering.
CODING FOR RELIABLE SATELLITE COMMUNICATIONS Semiannual Report
Shu Lin [1984] 11 p refs
(Grant NAG5-407)
(NASA-CR-174315; NAS 1.26:174315) Avail: NTIS HC A02/MF A01 CSCL 17B

Several error control coding techniques for reliable satellite communications were investigated to find algorithms for fast decoding of Reed-Solomon codes in terms of dual basis. The decoding of the (255,223) Reed-Solomon code, which is used as the outer code in the concatenated TDRSS decoder, was of particular concern. R.S.F.

N85-17258*# Ohio State Univ., Columbus. ElectroScience Lab.
ADAPTIVE ANTENNA ARRAYS FOR WEAK INTERFERING SIGNALS
Inder J. Gupta Jan. 1985 71 p refs
(Grant NAG3-536)
(NASA-CR-174336; NAS 1.26:174336; ESL-716111-2) Avail: NTIS HC A04/MF A01 CSCL 09E

The interference protection provided by adaptive antenna arrays to an Earth station or satellite receive antenna system is studied. The case where the interference is caused by the transmission from adjacent satellites or Earth stations whose signals inadverently enter the receiving system and interfere with the communication link is considered. Thus, the interfering signals are very weak. To increase the interference suppression, one can either decrease the thermal noise in the feedback loops or increase the gain of the auxiliary antennas in the interfering signal direction. Both methods are examined. It is shown that one may have to reduce the noise correlation to impractically low values and if directive auxiliary antennas are used, the auxiliary antenna size may have to be too large. One can, however, combine the two methods to achieve the specified interference suppression with reasonable requirements of noise decorrelation and auxiliary antenna size. Effects of the errors in the steering vector on the adaptive array performance are studied. R.S.F.

N85-17259*# Ball Aerospace Systems Div., Boulder, Colo.
SPACEBORNE DISTRIBUTED SAR ANTENNA Final Report
Dan McKenna 28 Dec. 1984 34 p
(Contract NAS9-17062)
(NASA-CR-171835; NAS 1.26:171835) Avail: NTIS HC A03/MF A01 CSCL 20N

The MSAR c-band array panel was developed and tested. Each element of the antenna system is discussed individually as well as collectively. Textual descriptions together with test data are both used to enable a clear understanding of the antenna system performance. In general, test data has confirmed or exceeded expectations. Of particular note is the excellent cross polarization achieved with a field cancelling geometry. B.G.

N85-17260# Naval Research Lab., Washington, D. C.
ARCHITECTURE FOR A DEMONSTRATION RADAR-COMMUNICATION LINK Interim Report, Oct. 1981 - Apr. 1984
J. O. Coleman 28 Sep. 1984 22 p
(F12-131)
(AD-A147635; NRL-8829) Avail: NTIS HC A02/MF A01 CSCL 17/2

For the best surveillance picture, surveillance data from sources on different platforms should be combined. This requires a robust communication capability for transferring both raw sensor data and processed track data between platforms. A communication system can be built using existing radar transmitters and antennas. This report describes a communications architecture and associated programs used in a demonstration of such a system. The system outlined controls the interfacing of the communication and radar functions, controls system timing, and provides framing of messages and various levels of error control. The services provided by this architecture allow the communication link to be used by client systems with only minimal concern with the details of the link's operation. A brief description of possibly useful extensions to the system is included. GRA

N85-17261# Rome Air Development Center, Griffiss AFB, N.Y.
THE EFFECTS OF SOIL MOISTURE ON BISTATIC CLUTTER POWER Report, for Jun. 1982 - Jun. 1984
J. F. Lennon and R. J. Papa Jul. 1984 63 p
(AF Proj. 2305)
(AD-A147636; RADC-TR-84-164) Avail: NTIS HC A04/MF A01 CSCL 17/9

A major question for rough surface scattering analyses is how moisture affects the results. This study represents an extensive discussion of moisture effects in bistatic scattering. Considerable emphasis is placed on the roughness dependence of the effects. Comparisons are presented that show that the standard simplified bistatic model tends to suppress some of the effects and differs considerably from a more complete analysis. The effects of successively increasing the relative moisture levels are shown. A number of antenna power patterns are considered and the effects of relative heights and separation of the antennas are discussed. Finally, the basic study is extended to other system parameters. These include signal frequency and polarization. The relative effect of the moisture is found to be sensitive to these factors and, particularly, to the surface roughness. GRA

N85-17262# Lincoln Lab., Mass. Inst. of Tech., Lexington.
DISTRIBUTED SENSOR NETWORKS Semiannual Technical Summary Report, 1 Oct. 1983 - 31 Mar. 1984
R. T. Lacoss 31 Mar. 1984 32 p
(Contract F19628-80-C-0002; ARPA Order 3345)
(AD-A147638; ESD-TR-84-036) Avail: NTIS HC A03/MF A01 CSCL 09/2

Contents: Wideband Array Processing for Direction Determination; TV Sensor Subsystem; Distributed Tracking; Knowledge-based Data Interpretation; Communications; and Self-Location. GRA

N85-17263# Signatron, Inc., Lexington, Mass.
EMC (ELECTROMAGNETIC COMPATIBILITY) SPEC CRITERIA IN VOLTERRA SYSTEMS Final Technical Report, Feb. 1983 - May 1984
L. D. Tromp and M. Rudko Griffiss AFB, N.Y. RADC Jun. 1984 212 p
(Contract F30602-82-C-0163)
(AD-A147659; RADC-TR-84-147) Avail: NTIS HC A10/MF A01 CSCL 20/14

Identification of nonlinear transfer functions (NLTF) and their use in predicting electromagnetic compatibility (EMC) specification parameters such as intermodulation and harmonic distortion was studied. It was assumed that the nonlinear systems of interest can be modeled as lumped parameter circuits with zero-memory nonlinearities between circuit nodes. In this case, the NLTF poles are determined by the poles of the linear transfer function (LTF) of the circuit. Two different cases were considered. In the first case, a transient response measurement of the LTF output can be used to identify the linear system poles. The poles of the LTF then specify the poles of the NLTFs. In the second case, the received signal contains a strong direct path component which is independent of the nonlinear system which is to be identified. This situation arises in the identification of the rusty bolt (a Metal-Insulator-Metal junction). Under this condition, the rusty bolt linear response cannot be measured directly and it is then necessary to estimate the poles of both the LTF and NLTFs from sinusoidal steady state third-order nonlinear response measurements. Author (GRA)

N85-17264# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
PLURIBUS SATELLITE IMP DEVELOPMENT MOBILE ACCESS TERMINAL NETWORK Quarterly Technical Report, 1 Feb. - 30 Apr. 1984
May 1984 30 p
(Contracts MDA903-80-C-0353; N00039-81-C-0408)
(AD-A147675; BBN-5774; QTR-33) Avail: NTIS HC A03/MF A01 CSCL 17/2

This Quarterly Technical Report describes work on the development of Pluribus Satellite IMPs: and on Shipboard satellite communications. Author (GRA)

N85-17265# IIT Research Inst., Chicago, Ill.
EXTREMELY LOW FREQUENCY (ELF) COMMUNICATIONS SYSTEM ECOLOGICAL MONITORING PROGRAM: SUMMARY OF 1983 PROGRESS Annual Progress Report, 1 Jan. - 31 Dec. 1983
J. Zapotosky, M. M. Abromovage, and J. O. Enk Jul. 1984 57 p
(Contract N00039-84-C-0070)
(AD-A147704; IITRI-E06549-9) Avail: NTIS HC A04/MF A01 CSCL 06/6

A long-term program for studying possible effects from operation of the Navy's ELF Communication System is being conducted on biota and ecosystems components in northwestern Wisconsin and the Upper Peninsula of Michigan. Sixteen general types of organisms from three major ecosystems in the ELF System are being examined. Formulation of an ELF Ecological Monitoring Program was completed in early 1982 by the Department of the Navy. Monitoring studies were selected through a peer-reviewed, competitive bidding process in mid-1982 and studies were initiated in the late summer. Major activities of the program during 1983 consisted of characterization of critical aspects of each study, collection of data to validate assumptions made in proposals, and selection of study sites. Progress is summarized for the 10 projects that comprise the Program. Author (GRA)

N85-17266# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
REAL-TIME ESTIMATION OF AMPLITUDE AND GROUP DELAY DISTORTION IN A PSK LINE-OF-SIGHT COMMUNICATIONS CHANNEL Ph.D. Thesis
G. E. Prescott Jun. 1984 173 p
(AD-A147735; AFIT/CI/NR-84-74D) Avail: NTIS HC A08/MF A01 CSCL 17/2

Linear transmission distortion is a malady which is common to communication transmission systems of all types. Compensating for - or equalizing - this form of distortion is essential in order to realize the maximum possible error-free transmission of information. There are many established techniques for negating the effects of linear distortion with no regard to the type or severity of distortion present. The object of the research described by this thesis is the development of an on-line technique for estimating linear transmission distortion parameters which are common to narrowband line-of-sight terrestrial microwave communication systems employing M-ary PSK modulation. The parameters of interest are represented as coefficients of a polynomial channel model in order to indicate the degree of amplitude and group delay distortion present in the channel. This new approach employs an algorithm which first estimates the discrete channel pulse response, then determines the amount of amplitude and group delay distortion present in the estimated channel pulse response. GRA

N85-17267# Lee (J. S.) Associates, Inc., Arlington, Va.
OPTIMUM JAMMING EFFECTS ON FREQUENCY-HOPPING M-ARY FSK (FREQUENCY-SHIFT KEYING) SYSTEMS UNDER CERTAIN ECCM (ELECTRONIC COUNTER-COUNTERMEASURES) RECEIVER DESIGN STRATEGIES Final Report, 1 Mar. - 30 Sep. 1984
J. S. Lee, L. E. Miller, R. H. French, Y. K. Kim, and A. P. Kadrichu Oct. 1984 604 p
(Contract N00014-83-C-0312)
(AD-A147766; JC-2025-N) Avail: NTIS HC A99/MF A01 CSCL 17/4

The performance of M-ary frequency-shift-keying frequency-hopping systems using multiple hops per symbol waveform is derived and evaluated for the cases of worst-case partial-band noise jamming and worst-case partial-band tone jamming. The analyses include the effects of the jamming under certain ECCM receiver design strategies. The receiver design strategies include the convention square-law linear combiner and the several types of unconventional nonlinear combiners. The ECCM receiver design employing the nonlinear combiners are found to provide diversity gains whereas such gains are not realized under the conventional linear combining strategy. Author (GRA)

N85-17268# Megapulse, Inc., Bedford, Mass.
ELECTROMAGNETIC FIELDS FROM THE GENERATION AND ABSORPTION OF DISCONTINUOUS LINEAR CURRENT FRONTS Interim Report, 1 May 1982 - 1 May 1983
E. A. Lewis Griffiss AFB, N.Y. RADC Jul. 1984 39 p
(Contract F19628-80-C-0146)
(AD-A148076; RADC-TR-84-153) Avail: NTIS HC A03/MF A01 CSCL 20/3

The relativistically correct potentials and fields are calculated for a basic electromagnetic source-model in which the electric charge at a fixed point suddenly starts increasing linearly with time, while the equal but opposite charge flows away from the point with constant velocity in a straight line. A numerical example of a field calculation is given. Limiting forms of the solution appropriate at great distances are found, and radiated power, radiation resistance, and radiation patterns are derived. Using the solution for ths basic model, solutions for other source-models are developed by linear superposition. These include fields from a current being generated at one point and stopped (absorbed) at another, and the fields from current impulses. Author (GRA)

N85-17269# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Mathematics and Computer Science.
NONLINEAR WAVE PROPAGATION Annual Technical Report, 1 Oct. 1983 - 30 Sep. 1984
M. J. Ablowitz Sep. 1984 50 p
(Grant AF-AFOSR-0005-84)
(AD-A148114; AFOSR-84-0984TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The essential point of view involved in this work is the continued study of certain fundamental features associated with the nonlinear wave propagation arising in and motivated by physical problems. The usefulness of the work is attested to by the varied applications, and wide areas of interest in physics, engineering and mathematics. The work accomplished involves wave propagation in a number of areas including fluid mechanics, plasma physics, nonlinear optics, multidimensional solitons, multidimensional inverse problems, Painlevel equations, direct linearizations of certain nonlinear wave equations, DBAR problems, Riemann-Hilbert boundary value problems etc. Author (GRA)

N85-17270# Naval Research Lab., Washington, D. C. Plasma Physics Div.
BEAM PROPAGATION STUDIES AT NRL (NAVAL RESEARCH LABORATORY) JULY 1983 TO JUNE 1984, VOLUME 2 Interim Report
R. Hubbard (Jaycor, Inc., Alexandria, Va.), M. Raleigh, D. Murphy, R. Pechacek, J. R. Greig, S. Slinker (Jaycor, Inc., Alexandria, Va.), A. W. Ali, J. M. Picone, J. Boris, E. Oran et al 30 Nov. 1984 47 p
(ARPA Order 4395)
(AD-A148198; NRL-MR-5412) Avail: NTIS HC A03/MF A01 CSCL 20/14

This report is comprised of summaries of unclassified papers presented at the DARPA/Services Annual Propagation Review, June 1984, at the Naval Postgraduate School, Monterey, California. A variety of theoretical and experimental studies are covered, including a review of propagation community codes and topics in channel chemistry, holeboring, hose instability, diagnostics, and beam channel tracking. The papers and authors are listed in the order in which they appeared at the meeting. This report does not include those papers whose first authors were Naval Surface Weapons Center personnel. GRA

N85-17271# Universidad Politecnica de Barcelona (Spain). Escuela Tecnica Superior De Ingenieros De Telecommunicacion.
DEVELOPMENT OF A 20/30 GHz RECEIVING STATION FOR PROPAGATION EXPERIMENTS WITH L-SAT Final Report, 1 Sep. 1983 - 31 Aug. 1984
Angel Cardama 25 Oct. 1984 63 p
(Grant AF-AFOSR-0337-83)
(AD-A148261; EOARD-TR-85-2) Avail: NTIS HC A04/MF A01 CSCL 20/14

Basic technological work done on a 20/30 GHz L-SAT propagation experiment receiver is presented, covering receiver configuration, measurement systems, Gunn-diode oscillators, fin-line transitions and cylindrical near field antenna measurement systems. Author (GRA)

N85-17272# IIT Research Inst., Chicago, Ill.
COMPILATION OF ANNUAL REPORTS OF THE NAVY ELF (EXTREMELY LOW FREQUENCY) COMMUNICATIONS SYSTEM ECOLOGICAL MONITORING PROGRAM. VOLUME 1: TABS A-E Annual Progress Report, Nov. 1982 - Dec. 1983
M. Anderson, J. Bruhn, P. Cattelino, R. Janke, M. Jurgensen, G. Mroz, E. J. Reed, and C. Trettin Jul. 1984 542 p 2 Vol.
(Contracts N00039-84-C-0070; N00039-81-C-0357)
(AD-A148326; IITRI-E06549-8-Vol-1) Avail: NTIS HC A23/MF A01 CSCL 06/6

A long-term program of studying ELF electromagnetic influences on ecosystems in northwestern Wisconsin and the Upper Peninsula of Michigan is being conducted. Selection of study sites, monitoring protocols, and analytical methods were initiated in 1982. Data collection was initiated in 1983. Progress is described for studying the terrestrial, aquatic, and wetland ecosystems for the 10 projects comprising the ecological monitoring program. The 10 projects contain Herbaceous Plant Cover and Tree Studies; Litter Decomposition and Microflora; The Effects of Exposing the Slime Mold Physarum polycephalum; Soil Amoeba; Soil and Litter Arthropoda and Earthworm Studies; Biological Studies on Pollinating Insects (Megachilid Bees); Small Vertebrates (Small Mammals and Nesting Birds); Aquatic Ecosystems; Wetland Studies; and Field Studies of Effects of ELF on Migrating Birds. GRA

N85-17273# IIT Research Inst., Chicago, Ill.
COMPILATION OF ANNUAL REPORTS OF THE NAVY ELF (EXTREMELY LOW FREQUENCY) COMMUNICATIONS SYSTEM ECOLOGICAL MONITORING PROGRAM (1983). VOLUME 2: TABS F-J Annual Progress Report, Nov. 1982 - Dec. 1983
R. L. Fischer, D. L. Beaver, J. H. Asher, R. W. Hill, and T. M. Burton Jul. 1984 576 p 2 Vol.
(Contracts N00039-84-C-0070; N00039-81-C-0357)
(AD-A148327; IITRI-E06549-8-Vol-2) Avail: NTIS HC A25/MF A01 CSCL 06/6

The climatic factors which are known to impinge upon the biological behavior patterns of the megachilid bees were measured. Statistical testing of man-made influences such as ELF into the environment were pursued, with emphasis on nest architecture, pollen collection, and ability to orient to nest sites. B.G.

N85-17274# Mitre Corp., McLean, Va.
SEASAT 3 AND 4
K. Case, C. Callan, R. Dashen, R. Davis, W. Munk, J. Vesecky, K. Watson, and F. Zachariasen Aug. 1984 141 p
(Contract F19628-84-C-0001)
(AD-A148343; JSR-84-203) Avail: NTIS HC A07/MF A01 CSCL 17/9

JASON continues its theoretical investigation of understanding the origin of the ship wakes seen by the SEASAT radar. The present effort incorporates the new experimental results from the Georgia Strait and the Gulf of Alaska experiments. These experiments appear to rule out the internal wave hypothesis; they also seem to indicate that the Kelvin Wake (here defined in the most general sense to include non-linear processes as well as interactions with the turbulent wake) is rather different than conventional Kelvin wake theory would predict. Nonetheless, a model which seems to be at least qualitatively reasonable can be constructed. The generation of ship wakes (surface or internal) and their detection by radar is a complicated phenomenology involving various branches of physics, hydrodynamics and oceanography. Nevertheless, with the exception of the inner, small angle part of the Kelvin wake, we believe that the theoretical understanding of the problem is adequate to support the conclusions reached in the report. Author (GRA)

N85-17275# Mitre Corp., McLean, Va.
SECOND ORDER BRAGG SCATTERING IN A SAR
R. Davis Aug. 1984 13 p
(Contract F19628-84-C-0001)
(AD-A148395; JSR-84-203A) Avail: NTIS HC A02/MF A01 CSCL 17/9

Why might we see narrow lines from second order Bragg scattering? If we accept the notion that the short-wave components of the ship wake are slightly distorted versions of the Kelvin wake, then there is the possibility of scattering, at a given place, from a spectrum of waves. The Dabob Bay data indicates that there is little energy in the wake having wave numbers capable of producing first-order Bragg scattering of L-band radar. This could be taken as explaining why even narrower V wakes are not observed. But the observations do show considerable enhancement of waves of twice the Bragg wavelength at the angle where a SAR wake is observed. GRA

N85-17276# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EQUIPMENT FOR MULTIPLEXING MULTICHANNEL RADIO-RELAY LINES OF COMMUNICATION
M. N. Stoyanov 8 Nov. 1984 5 p Transl. into ENGLISH from Vestn. Svyazi (USSR), no. 3, 1971
(AD-A148402; FTD-ID(RS)T-0519-84) Copyright. Avail: NTIS HC A02/MF A01 CSCL 17/2

The equipment is intended for organizing six hf telephone channels in the frequency range of 4 to 32 kHz in a single-band four-wore system. The channels of the equipment are intended for use in a system of rural communication as connecting lines between terminal RTS and ATS, and also for organizing the automatic transit through ATS. Depending on the type of tandem ATS the automatic connection of channels can be realized in two-wire and four-wire systems. The equipment provides the opportunity of secondary multiplexing of channels. Author

N85-17277# Naval Surface Weapons Center, White Oak, Md.
NSWC-NADC INTERACTIVE COMMUNICATION LINKS FOR AN/UYS-1 LOADTAPE CREATION AND RETRIEVAL Final Report
D. M. Greathouse 28 Sep. 1984 37 p
(AD-A148418; NSWC/TR-84-420) Avail: NTIS HC A03/MF A01 CSCL 17/2

This report contains an alternative method of communication (interactive vs. remote batch) with the Naval Air Development Center for the creation and retrieval of AN/UYS-1 Advanced Signal Processor (ASP) operational software loadtapes. Operational software for the Digital Acoustic Sensor Simulator (DASS) program is developed and maintained at the Naval Air Development Center (NADC). The Facility for Automated Software Production (FASP), an NADC-resident software generation facility, provides the support tools necessary for data base creation, software development and maintenance, and loadtape generation. Once a loadtape file is generated at NADC, it must be retrieved via telephone transmission and placed in a format suitable for loading into the AN/UYS-1 Advanced Signal Processor (ASP). GRA

N85-17278# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
TRANSMISSION SCHEDULING TO REDUCE CONVEX DELAY COSTS IN PACKET NETWORKS M.S. Thesis
D. M. Thabit Oct. 1984 72 p
(Contract N00014-84-K-0357; DARPA Order 3045)
(AD-A148451; LIDS-TH-1416) Avail: NTIS HC A04/MF A01 CSCL 17/2

Delay is a fundamental issue in packet communication networks. Previous work has focused on expected delay as a performance measure in queueing modele, in the context of routing. It is clear that some types of traffic are more sensitive to delay than others, and some simple priority structures have been proposed; but the fact that expected delay is not very meaningful for certain applications (e.g., packetized voice, which has a critical delay ceiling) has received little attention. GRA

N85-17279# ALPHATECH, Inc., Burlington, Mass.
HYBRID STATE ESTIMATION APPROACH TO MULTIOBJECT TRACKING FOR AIRBORNE SURVEILLANCE RADARS
R. B. Washburn, T. Kurien, A. L. Blitz, and A. S. Willsky Oct. 1984 101 p
(Contract N00019-82-C-0456)
(AD-A148459; TR-180) Avail: NTIS HC A06/MF A01 CSCL 17/9

This report describes the application of hyrbid state estimation theory to develop a unified theory of airborne surveillance. Hybrid state estimation provides a framework for treating estimation problems in which both continuous, numerical-valued variables and discrete, logical-valued variables occur. This framework allows one to model many different surveillance problems (such as multiple maneuvering targets, formation flying, missile launch and interception) and to construct the corresponding tracking algorithm. This report examines such models and investigates the resulting optimal and suboptimal tracking algorithms. Author (GRA)

N85-17280# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Computerized Speech Recognition Technologies.
AUTOMATIC SPEECH RECOGNITION IN SEVERE ENVIRONMENTS Final Report, 15 Apr. 1983 - 15 Aug. 1984
1984 14 p
(Contract N00014-83-G-0072; RR0-4209)
(AD-A148461) Avail: NTIS HC A02/MF A01 CSCL 05/8

The report examines the status and outlook for voice interaction in moderate and severe environments; the primary focus is on the technology of speech recognition and human factor issues associated with its application. Issues in the technology voice input/output are reviewed, and basic concepts in speech technology are investigated. A current status report on computerized speech technology is given and current applications are discussed. The committee indicates directions for future work and then ends with conclusions and recommendations. GRA

N85-17281# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
METHODOLOGY IMPROVEMENT PROGRAM FOR THE SECOND GENERATION MISS DISTANCE RADAR (MIDI 2) Final Technical Report, 29 Mar. - 30 Oct. 1984
G. V. Morris, B. Perry IV, and R. B. Efurd 30 Oct 1984 195 p
(Contract DABT60-84-C-0040)
(AD-A148467; GIT/EES-A-3812-FTR) Avail: NTIS HC A09/MF A01 CSCL 17/9

The present miss distance indicator (MIDI 1) radar tracks a target and measures the vector miss distance of projectiles fired at the target. The major conclusion of this study is that the MIDI 1 limitation of operating against targets 150 meters or more above ground level can be improved down to 15 meters for gun scoring and 60 meters for missile scoring by applying a combination of radar techniques such as: (1) pulsed Doppler to attenuate the ground clutter; (2) multiple, selectable antenna beamwidths to meet both low altitude operation and scoring volume requirements; and (3) a remote antenna/receiver/transmitter to provide favorable elevation geometry. GRA

N85-17282# Naval Research Lab., Washington, D. C.
PROPAGATION AND SCATTERING CONSIDERATIONS FOR THE 0.2-3.0 GHz FREQUENCY RANGE FOR A SPACE-BASED RADAR
H. J. Bilow 18 Dec. 1984 61 p
(AD-A148504; NRL-MR-5453) Avail: NTIS HC A04/MF A01 CSCL 17/9

A survey is made of major phenomena of the lower atmosphere and ionosphere which would introduce clutter and affect propagation in the 0.2-3.0 GHz frequency range in a space-based, ground-looking radar. Attenuation, refractive effects, and weather-related phenomena are included in the study. It is found that the major trade-off that must be made in the frequency range is the relative immunity of the low frequencies to weather

related phenomena versus the relative immunity of the high frequencies to deleterious ionospheric effects. Author (GRA)

N85-17283# General Electric Co., Syracuse, N.Y. Military Electronic Systems Operation.
TROPOSPHERIC AND IONOSPHERIC PHASE PERTURBATIONS AND DOPPLER FREQUENCY SHIFT EFFECTS
George H. Millman and Michael C. Arabadjis Aug. 1984 75 p
(AD-A148579; R84EMH003) Avail: NTIS HC A04/MF A01 CSCL 17/2

The temporal and spatial variations of the indices of refraction, i.e., dielectric constant, in the tropospheric and ionospheric media induce phase perturbations in radio signals propagated in an earth-space transmission system. Using ionospheric phase scintillation spectral data, estimates are made of the magnitude of ionospheric integrated phase noise and phase noise density at specific frequencies. The refraction phenomenon in the troposphere and ionosphere causes an error in the Doppler frequency shift of radio transmissions emitted from a nonstationary satellite and received on the ground. Estimates are made of the Doppler error for various atmospheric and solar-geophysical conditions and are applicable for frequencies in the VHF-UHF range and above. GRA

N85-17284# Department of the Navy, Washington, D. C.
A GYRO SENSOR BLOCK SUSPENSION Patent Application
A. Cangialosi, inventor (to Navy) Filed 7 Nov. 1983 9 p
(AD-D011411; US-Patent-Appl-SN-549019) Avail: NTIS HC A02/MF A01 CSCL 17/7

A gyro sensor block suspension provides a mechanical means to eliminate dither cross-talk by use of a spring suspension of differing stiffness at two or three gyro locations. B.G.

N85-17285# Department of the Air Force, Washington, D.C.
INTEGRATED DEFENSE COMMUNICATIONS SYSTEM ANTI-JAMMING ANTENNA SYSTEM Patent Application
P. W. Hannan, inventor (to Air Force) Filed 25 Sep. 1984 10 p
(AD-D011423; US-Patent-Appl-SN-654338) Avail: NTIS HC A02/MF A01 CSCL 17/4

The isolation of mainbeam and sidelobe jamming signals from the desired signal being relayed by microwave communication links is accomplished by an antijamming antenna comprising a flat radome, a curved reflector and a transmit dipole. Positioned adjacent the dipole is a monopulse feed and comparator for main-beam jammers (dual-plane monopulse, multi-mode multilayer feed). Also forming part of the integrated antenna are auxiliary units for near-sidelobe and far-sidelobe jammers. An alternative embodiment includes a Cassegrain grating sub-reflector. Since the direction of the desired incoming signal in microwave communication links is precisely known, the antijamming antenna uses azimuth and elevation monopulse to make a spatial distinction between the desired incoming signal and the jamming signals. The anti-jamming antenna system outputs: a sum, azimuth difference elevation difference signals and isolated near-sidelobe jamming signals and far-sidelobe jamming signals on output ports which allow an adaptive processor to place pattern nulls on jammers located in the mainbeam and sidelobe region of the antenna.GRA

N85-17286# Department of the Air Force, Washington, D.C.
AN ADAPTIVE FAST FOURIER TRANSFORM WEIGHTING TECHNIQUE TO INCREASE SMALL TARGET SENSITIVITY Patent Application
S. M. Bryant, inventor (to Air Force) Filed 2 Oct. 1984 28 p
(AD-D011424; US-Patent-Appl-SN-656844) Avail: NTIS HC A03/MF A01 CSCL 17/9

A radar signal processor is described which operates without clutter canceller and AGC circuits by applying an adaptive weighting circuit which adjusts the FFT weighting function on a range gate basis to account for clutter in that range gate. An input buffer determines log to the base 2 values per range gate for use in the weighting operation and a normalization circuit scales the weighted FFT output to facilitate post-processing. GRA

N85-17287# Department of the Air Force, Washington, D.C.
GAIN RESTORATION AFTER DOPPLER FILTERING Patent Application
S. M. Bryant, inventor (to Air Force) Filed 2 Oct. 1984 17 p
(AD-D011425; US-Patent-Appl-SN-656845) Avail: NTIS HC A02/MF A01 CSCL 17/9

Automatic gain control in a pulse Doppler radar receiver is provided after Doppler filtering by a gain restoration system which embodies dynamic correction based on variable returns from clutter and targets. The radar uses a digital fast automatic gain control (FAGC) with a technique known as block adaptive signal regulation (BASR). This technique evaluates all the time samples in a range gate before they enter the Fast Fourier Transform (FFT) circuit. The invention of this disclosure feeds the information regarding the number of BASR shifts, N, forward to the output of the FFT as a function of range gate. In this way the gain-corrected amplitudes are available for target centroiding. The concept of dynamic FAGC correction based upon the amplitude of clutter and target returns avoids the problems encountered when the system is used in an urban area or with a narrow clutter notch filter. In the past, such operation has resulted in a loss of detectability on small targets in the presence of large targets. However, the gain restoration system described herein feeds the information regarding the number of BASR shifts, N, forward to the output of the FFT as a function of range gate. GRA

N85-17288# Department of the Air Force, Washington, D.C.
A TECHNIQUE FOR RAPID DETERMINATION OF PROBABILITY OF DETECTION IN PULSE DOPPLER RADARS Patent Application
S. M. Bryant, inventor (to Air Force) Filed 2 Oct. 1981 18 p
(AD-D011426; US-Patent-Appl-SN-657099) Avail: NTIS HC A02/MF A01 CSCL 17/9

A technique and apparatus are disclosed for determining the performance of a pulse doppler radar system every period. The test is accomplished by injecting into the front end of the radar a highly calibrated signal during initialization or during a periodic test, and measuring the signal at the Fast Fourier Transform (FFT) output. This measured signal is used by the radar signal processor as a reference signal which is adjusted for internally induced changes by the radar's signal processing system then summed with the in-phase amplitude of the selected range gate filter cell. The summed signal and the cell quadrature amplitude are then envelope detected, and a detection counter is incremented when the envelope detection compares favorably with the cell's constant false alarm rate. At each integration period, the process is repeated for all range gate filter cells to obtain a detection count. GRA

N85-17289# Naval Research Lab., Washington, D. C.
A COMMENTRAY ON THE UTILIZATION OF REAL-TIME CHANNEL EVALUATION SYSTEMS IN HF SPECTRUM MANAGEMENT
J. M. Goodman, M. Daehler, M. H. Reilly, and A. J. Martin 28 Nov. 1984 10 p
(AD-A148616; NRL-MR-5454) Avail: NTIS HC A02/MF A01 CSCL 17/2

Real-Time Channel Evaluation (RTCE) devices are coming into increased use in modern management of HF communications systems. The earliest techniques used in channel evaluation exploited vertical incidence pulse sounders (VIS) and these devices are still being used for some applications. An oblique incidence sounding technology has also been developed employing both pulse and chirp waveform approaches. A variety of RTCE devices are identified in the report but the emphasis is placed on the OIS chirp sounder. Using this device as a canonical channel evaluator, the implications for global, theater, and local HF resource management may be addressed. As one might suspect, there are both advantages and disadvantages which may accrue from construction of a sounder network. Issues include: data applicability, data collection and dissemination, network size and cost, network ECM vulnerabilities, optimum network architecture, and system component reliabilities, to name a few. These issues are outlined in the report. GRA

N85-17290# Harris Corp., Melbourne, Fla.
RF FIBER OPTIC LINK Final Report, Oct. 1981 - May 1983
J. J. Pan Griffiss AFB, N.Y. RADC Jun. 1984 181 p
(Contract F30602-81-C-0259)
(AD-A148679; RF-001/0161A; RADC-TR-84-118) Avail: NTIS HC A09/MF A01 CSCL 17/2

A fiber optic link which sets the state of the art (July 1982) in direct optical source modulation in passing a RF carrier and its associated modulation was developed under this Laboratory Director's funded program to Harris Corporation. The 1 kilometer long link has a 600 MHz passband and operates between 4.4 to 5.0 GHz. The gain flatness across the band was measured at +or- 1.5 db at a modulation depth of 65%. The input/output VSWR is 1.5 to 1db. The link employs a 3 state amplifier in the APD receiver and has provided a S/N of 48 db measured over a 300 KHz bandwidth. The S/N can be further improved by additional amplifier stages. Optical componentry within the link includes an injection laser diode operating at a wavelength of 840 nm and a single mode fiber with bandwith greater than 7 GHz and a core size of 6 micron. GRA

N85-17291# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
MILLIMETER WAVE ANTENNA TECHNOLOGY
R. B. Dybdal 30 Sep. 1984 41 p
(Contract F04701-83-0084)
(AD-A148694; TR-0084(4925-06)-1; SD-TR-84-52) Avail: NTIS HC A03/MF A01 CSCL 17/2

Millimeter wave antenna technology has had a long history of development, and as millimeter wave systems evolve through planning to implementation, a significant amount of additional development work will be required. Millimeter wave antennas play a key role in the rationale for millimeter system designs because high spatial resolution can be achieved with modest physical dimensions. Reflector, lens, array, and horn technologies are surveyed. Multiple beam designs and adaptive processing antennas are described because these technologies afford high leverage opportunities to enhance electronic survivability and to extend communication capabilities. Ancillary components, such as radomes, are a necessary part of practical antenna designs and are discussed in some detail. GRA

N85-17292# Research Inst. of National Defence, Linkoeping (Sweden).
EXTRACTION OF STRUCTURAL INFORMATION FROM RADAR SIGNALS
Hans Hellsten Aug. 1984 58 p refs
(Contract SWEDBSA-112/83)
(FOA-C-30370-E1; ISSN-0347-3708) Avail: NTIS HC A04/MF A01

A unified quantitative model of coherent and noncoherent radar imagery is outlined. The model adopts a Dirac bracket notation for the farfield electromagnetic amplitudes. The return scattering of the radar signal corresponds to an arbitrarily time and range dependent linear operator acting on these amplitudes. The radar measurement problem consists of reconstructing this operator from the emitted and received signal amplitudes. It is demonstrated that this problem can be solved unambiguously only if certain apriori conditions to which the emitted signal must be matched are satisfied. Author (ESA)

N85-16765# Joint Publications Research Service, Arlington, Va.
DESIGNER ON AEROFLOT AUTOMATED COMMO SYSTEM DEVELOPMENT
O. Goncharova *In its* USSR Rept.: Transportation (JPRS-UTR-85-001) 15 Jan. 1985 p 4-5 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 17 Nov. 1984 p 3 (For primary document see N85-16763 08-01)
Avail: NTIS HC A09/MF A01

N85-16807# Elmer, Rome (Italy).
TACTICAL HF COMMUNICATION FOR MILITARY HELICOPTERS USING THE NVIS MODE
G. Puccetti and P. L. Como *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 9 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16810# AEG-Telefunken, Ulm (West Germany).
LPI-RADAR FOR HELICOPTER OBSTACLE WARNING
H. Meinel, H.-G. Wippich, B. Rembold, and W. F. X. Frank *In* AGARD Helicopter Guidance and Control Systems for Battlefield Support Aug. 1984 7 p refs (For primary document see N85-16797 08-01)
Avail: NTIS HC A13/MF A01

N85-16948*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE S-BAND COMMUNICATIONS TECHNICAL CONCEPTS
J. W. Seyl, W. W. Seibert, J. A. Porter, D. S. Eggers, S. W. Novosad, H. A. Vang, S. D. Lenett, W. A. Lewton, and J. F. Pawlowski *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 720-756 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 17B

N85-16949*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE Ku-BAND COMMUNICATIONS/RADAR TECHNICAL CONCEPTS
J. W. Griffin, J. S. Kelley, A. W. Steiner, H. A. Vang, W. E. Zrubek, and G. K. Huth (Axiomatix Corp., Los Angeles, Calif.) *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 757-766 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 17B

N85-16950*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE PAYLOAD S-BAND COMMUNICATIONS SYSTEM
Bartus H. Batson, William E. Teasdale, James F. Pawlowski, and Oron L. Schmidt *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 767-776 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 17B

N85-16951*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TDRSS S-SHUTTLE UNIQUE RECEIVER EQUIPMENT
Aaron Weinberg (Stanford Telecommunications, Inc., McLean, Va.), John J. Schwartz, and Robert Spearing *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 777-786 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 17B

N85-16952*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE COMMUNICATIONS LINK ANALYSIS AND SIMULATION SYSTEM (CLASS)
Robert D. Godfrey *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 787-797 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 17B

N85-16953*# LinCom Corp., Los Angeles, Calif.
MODELING TECHNIQUES USED IN THE COMMUNICATIONS LINK ANALYSIS AND SIMULATION SYSTEM (CLASS)
Walter R. Braun and Teresa M. McKenzie *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 798-803 refs (For primary document see N85-16937 08-12)
(Contracts NAS5-27240; NAS4-25681; NAS5-23591)
Avail: NTIS HC A23/MF A01 CSCL 17B

N85-16954*# LinCom Corp., Los Angeles, Calif.
VALIDATION OF THE COMMUNICATIONS LINK ANALYSIS AND

SIMULATION SYSTEM (CLASS)
Walter R. Braun and Teresa M. McKenzie *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 804-809 refs (For primary document see N85-16937 08-12)
(Contracts NAS5-27240; NAS5-25681; NAS5-23591)
Avail: NTIS HC A23/MF A01 CSCL 17B

N85-16956*# LinCom Corp., Los Angeles, Calif.
DIGITAL SCRAMBLING FOR SHUTTLE COMMUNICATION LINKS: DO DRAWBACKS OUTWEIGH ADVANTAGES?
Khaled Dessouky *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 815-820 refs (For primary document see N85-16937 08-12)
(Contract NAS5-27240)
Avail: NTIS HC A23/MF A01 CSCL 17B

N85-16957*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NOVEL APPLICATIONS OF THE NASA/GSFC VITERBI DECODER HARDWARE SIMULATOR
Dirk J. M. Walvis (Stanford Telecommunication, Inc., McLean, Va.), Aaron Weinberg (Stanford Telecommunication, Inc., McLean, Va.), Denver W. Herr, and John J. Schwartz *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 821-830 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 17B

N85-16958*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ELECTRONICS SYSTEMS TEST LABORATORY TESTING OF SHUTTLE COMMUNICATIONS SYSTEMS
C. Jack Stoker and Linda K. Bromley *In its* Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 831-849 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 17B

N85-17179# Joint Publications Research Service, Arlington, Va.
TELECOMMUNICATIONS EQUIPMENT AT 1984 LEIPZIG SPRING FAIR
K. H. Weidenbruch et al *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 8-25 Transl. into ENGLISH from Nachrichtentech.-Elektron. (East Berlin), no. 3, 1984 p 83-86 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

N85-17464*# Instituto Geofisico del Peru, Lima.
BINARY PULSE COMPRESSION TECHNIQUES FOR MST RADARS
R. F. Woodman, M. P. Sulzer (Arecibo Observatory, Puerto Rico), and D. T. Farley (Cornell Univ., Ithaca, N.Y.) *In* International Council of Scientific Unions Middle Atmosphere Program, Vol. 13 Nov. 1984 p 155-165 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 17I

N85-17465*# Adelaide Univ. (Australia). Dept. of Physics.
THE ANALYSIS OF SPACED SENSOR RECORDS BY CORRELATION TECHNIQUES
B. H. Briggs *In* International Council of Scientific Unions Middle Atmosphere Program, Vol. 13 Nov. 1984 p 166-186 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 17I

N85-17466*# EISCAT Scientific Association, Kiruna (Sweden).
THE MST RADAR TECHNIQUE
J. Roettger (Max-Planck-Inst. fuer Aeronomie) *In* International Council of Scientific Unions Middle Atmosphere Program, Vol. 13 Nov. 1984 p 187-232 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 17I

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N85-17293 Department of the Navy, Washington, D. C.
COHERENT ARRAY OF JOSEPHSON OSCILLATORS WITH EXTERNAL BIAS LEADS Patent
J. E. Lukens, A. K. Jain, and P. M. Mankiewich, inventors (to Navy) Issued 4 Sep. 1984 5 p Supersedes AD-D008900 (AD-D011367; US-Patent-4,470,023; US-Patent-Appl-SN-258705; US-Patent-Class-331-107) Avail: US Patent and Trademark Office CSCL 09/5

A coherent array of Josephson oscillators is provided. Individual hysteresis-free Josephson junctions are longitudinally arranged in a line and have such a spacing as to substantially eliminate quasiparticle interactions. To provide a common frequency of operation, equal and opposite dc voltages are produced in adjacent pairs of the Josephson junctions by an arrangement of interlocking dc SQUID's (Superconductive Quantum Interference Device) connected to transversely extending biasing leads. Phase coherence for the array is provided by a RF current circulating in an inductive feedback path that loops between the ends of the array. GRA

N85-17294*# Sunstrand Energy Systems, Rockford, Ill.
DESIGN AND TEST OF A FOUR CHANNEL MOTOR FOR ELECTROMECHANICAL FLIGHT CONTROL ACTUATION Final Report
Dec. 1984 245 p
(Contract NAS9-16535)
(NASA-CR-171838; NAS 1.26:171838; S8308-R1) Avail: NTIS HC A11/MF A01 CSCL 09A

To provide a suitable electromagnetic torque summing approach to flight control system redundancy, a four channel motor capable of sustaining full performance after any two credible failures was designed, fabricated, and tested. The design consists of a single samarium cobalt permanent magnet rotor with four separate three phase windings arrayed in individual stator quadrants around the periphery. Trade studies established the sensitivities of weight and performance to such parameters as design speed, winding pattern, number of poles, magnet configuration, and strength. The motor electromagnetically sums the torque of the individual channels on a single rotor and eliminate complex mechanical gearing arrangements. A.R.H.

N85-17295# Naval Ship Research and Development Center, Annapolis, Md. Propulsion and Auxiliary Systems Dept.
INVESTIGATION OF ELECTRIC AND WEAR PHENOMENA OF LIQUID METAL WETTED COPPER FIBER BRUSHES UNDER CONDITIONS OF HIGH SLIP RING ECCENTRICITY
N. Sondergaard and P. Reilly Oct. 1984 23 p
(ZR00-00; ZR0-2401)
(AD-A147634; DTNSRDC/PAS-84-20) Avail: NTIS HC A02/MF A01 CSCL 13/9

Metallic fiber brushes wetted with a liquid metal could potentially provide a current collector for large scale homopolar machinery. This study investigates brushes composed of copper fibers swaged together at one end and wetted with the liquid metal, Nak78. The brushes are forced to carry current while an eccentric slip ring compresses and releases the fibers, modeling the effect of rotor runout in a full scale collector. Preliminary studies indicate that these brushes are not transferring noise free steady current nor maintaining low levels of wear. GRA

N85-17296# General Electric Co., Pittsfield, Mass. Ordnance Systems.
ELECTRICAL CHARACTERIZATION OF VLSI (VERY LARGE

SCALE INTEGRATION) MEMORIES Final Technical Report, Mar. 1981 - Jan. 1984
J. Schwehr, R. Mossman, M. Majchrowski, and P. Lasak Griffiss AFB, N.Y. RADC May 1984 143 p
(Contract F30602-81-C-0135)
(AD-A147657; RADC-TR-84-89) Avail: NTIS HC A07/MF A01 CSCL 09/5

Automatic and bench techniques are used to characterize the performance of several VLSI memory types. The characterization addressed AC, DC, program and erasure parameters over the full military voltage and temperature ranges. Data summaries are presented. Author (GRA)

N85-17297# ITT Aerospace/Optical Div., Fort Wayne, Ind.
EMC ENHANCED CONSTANT Z MODULATOR Final Technical Report, Feb. - Nov. 1983
R. E. Reed Griffiss AFB, N.Y. RADC Jun. 1984 62 p
(Contract F30602-83-C-0010)
(AD-A147715; RADC-TR-84-117) Avail: NTIS HC A04/MF A01 CSCL 09/5

The EMC Enhanced constant Z modulator (EECZM) research and development effort at ITT-A/OD was undertaken to provide an amplitude modulation capability for a low-noise, medium power (1 Watt), wideband (225-400 MHz), frequency hopping (1000 hops/sec) synthesizer currently in development at the ITT-A/OD facility for RADC. The primary objectives was to amplitude modulate the synthesizer's RF carrier to the required modulation percentage while avoiding frequency modulation of the RF carrier. AN RF carrier amplitude modulator can seriously degrade synthesizer noise performance through modulator impedance changes during the modulation cycle. This change in impedance causes frequency modulation of the synthesizer's voltage controller oscillator (VCO) resulting in RF carrier FM sideband extending far beyond the AM sidebands for a large modulation index. Usually the modulator is isolated from the VCO by 20 to 30 dB of buffer amplification to minimize VCO frequency modulation; however, buffer amplifiers tend to degrade the overall synthesizer noise performance. By controlling the modulator's impedance to the VCO during the modulation cycle, the VCO buffer stages can be omitted while RF carrier frequency modulation is minimized. GRA

N85-17298# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
LIFE CYCLE COST MODEL FOR VERY HIGH SPEED INTEGRATED CIRCUITS M.S. Thesis
E. A. Long Sep. 1984 242 p
(AD-A147798; AFIT/GLM/LSM/84S-39) Avail: NTIS HC A11/MF A01 CSCL 14/1

The Very High Speed Integrated Circuit (VHSIC) technology program is forecast to have a profound impact on performance, reliability, and cost of future avionics systems. An important question is: how do VHSIC design fabrication and support concepts impact life cycle cost (LCC) of a host system? To answer this question, an insertion model representative of future avionics systems is selected and LCCs are obtained for various chip designs and layout configurations which implement this model. This thesis then examines five factors affecting VHSIC chips with respect to LCC of a digital synthetic aperture radar processor. These factors are: (1) chip technology and design; (2) fabrication yields; (3) substrate type; (4) the degree to which computer-aided-design (CAD) methods are used; and (5) maintenance level. Of these factors, the greatest impact to LCC is chip fabrication yields. The least effect on LCC is the degree to which CAD methods are used. The remaining factors fall between these two. Originator-supplied keywords include: semiconductors, microcircuits and Chips(Electronics). GRA

N85-17299# Wisconsin Univ., Madison.
AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF OPTOGALVANIC EFFECTS Final Report, 15 Jun. 1981 - 14 Jun. 1984
J. E. Lawler Sep. 1984 35 p
(Contract ARO-MIPR-142-83; ARO-MIPR-39-82; Grant AF-AFOSR-0208-81)
(AD-A148089; ARO-18420.7-PH) Avail: NTIS HC A03/MF A01 CSCL 09/1

Optogalvanic effects are changes in the conductance of a gas discharge caused by absorption of light via a bound state transition of an atom or molecule. Optogalvanic effects of both signs are observed. Negative effects, which correspond to a decrease in discharge conductance, are of particular interests for application in pulsed power switching. Research on optogalvanic effects has resulted in: (1) a better understanding of the interaction of laser radiation and gas discharges, (2) the discovery of a mechanism for amplifying optogalvanic effects, and (3) the development of powerful new gas discharge diagnostics based on optogalvanic detection of Rydberg atoms. The amplified optogalvanic effects, which occur in the cathode fall, constitute a promising area for further research. GRA

N85-17300# Science Applications, Inc., McLean, Va.
ANALYTICAL AND NUMERICAL MODELING OF GYROTRONS Final Report, 21 May 1980 - 20 Jul. 1984
D. Dialetis, A. T. Drobot, V. Granatstein, K. R. Chu, A. T. Lin, T. M. Antonsen, Jr., and A. Gover Sep. 1984 578 p
(Contract N00014-84-C-2063)
(AD-A148100; SAI-84/1752) Avail: NTIS HC A25/MF A01 CSCL 12/1

This is the final report on work performed during the period 21 May 1980 through 20 July 1984. It describes the research activities of SAI personnel in support of the experimental and theoretical gyrotron development program at the Naval Research Laboratory. SAI conducted theoretical work consisting of analytical and numerical modeling of high power gyrotron radiation devices. The research effort has been focused on: Wideband amplifier design and theory; Megawatt oscillator design and theory; Quasi-optical resonator theory; and RF heating and current drive in a plasma. GRA

N85-17301# Lincoln Lab., Mass. Inst. of Tech., Lexington.
RESTRUCTURABLE VLSI PROGRAM Semiannual Technical Summary Report, 1 Oct. 1983 - 31 Mar. 1984
P. E. Blankenship 31 Mar. 1984 31 p
(Contract F19628-85-C-0002; ARPA Order 3797; AF Proj. 3D30)
(AD-A148145; ESD-TR-84-021) Avail: NTIS HC A03/MF A01 CSCL 09/5

Design methodologies, architectures, design aids, and testing strategies for implementing water-scale systems with complexities approaching a million gates are discussed. A modular style of architecture comprising an array of cells embedded in a regular interconnection matrix is envisioned. R.J.F.

N85-17302# Utah Univ., Salt Lake City. Dept. of Bioengineering.
FLUCTUATION PHENOMENA STUDIES IN CHEMICALLY SENSITIVE FIELD EFFECT TRANSISTORS. PART 2: CORROSION OF SILICON OXYNITRIDE Interim Technical Report
Zheng Kang Li, Johannes M. Reijn, and Jiri Janata 20 Nov. 1984 25 p
(Contract N00014-81-K-0664; NR Proj. 051-778)
(AD-A148227; TR-5) Avail: NTIS HC A02/MF A01 CSCL 09/1

Drain current fluctuations in a field effect transistor caused by the corrosion of silicon oxynitride was measured and analyzed. It has been shown that under wet etching conditions the surface of silicon oxynitride becomes conducting. The equivalent electrical circuit corresponding to this situation was proposed. GRA

N85-17303# Massachusetts Inst. of Tech., Cambridge.
QUANTUM NOISE AND EXCESS NOISE IN OPTICAL HOMODYNE AND HETERODYNE RECEIVERS
J. H. Shapiro 1984 55 p
(Contract N00014-81-K-0662; ARPA Order 4258)
(AD-A148298) Avail: NTIS HC A04/MF A01 CSCL 09/4

A parallel development of the semiclassical and quantum statistics of multi-spatiotemporal mode direct, homodyne, and heterodyne detection using an ideal (except for its sub-unity

quantum efficiency) photon detector is presented. Particular emphasis is placed on the latter two coherent detection configurations. The primary intent is to delineate the semiclassical theory's regime of validity and to show, within this regime of validity, how the quantum theory's signal quantum noise, local oscillator quantum noise, the quantum noise incurred because of sub-unity detector quantum efficiency, plus (for heterodyning only) image band quantum noise produce the quantitative equivalent of the semiclassical theory's local oscillator shot noise. The effects of classical fluctuations on the local oscillator, and the recently suggested dual-detector arrangement for suppressing these fluctuations, are treated. It is shown that previous studies of this arrangement have neglected a potentially significant noise contribution. Author (GRA)

N85-17304# Texas Univ., Arlington. Dept. of Electrical Engineering.
TUNABLE MICROWAVE TRANSVERSAL FILTERS Annual Technical Report, 1 Aug. 1982 - 31 Jul. 1984
J. M. Owens and R. L. Carter 1 May 1984 213 p
(Grant AF-AFOSR-0264-80; AF Proj. 2306)
(AD-A148370; AFOSR-84-0977TR) Avail: NTIS HC A10/MF A01 CSCL 20/1

This final report for the third year of contract AFOSR-80-0264 summarizes the results of a fundamental investigation of a viable technological realization of this goal through magnetostatic waves MSW propagating at microwave frequency in magnetically biased, liquid phase epitaxial films of yttrium iron garnet (YIG) grown on gadolinium gallium garnet (GGG). This technology has a number of advantages; low loss (greater than 30dB/usec at X band), tunable by bias field to any center frequency (1-20GHz), long wavelengths (10-100 micrometers at any frequency), and finally a well understood and characterized wave phenomena (MSW) is utilized. The necessary non-recursive transversal filtering is achieved through multi-element transducer and/or the interaction of the MSW with periodic structures in or on the YIG film. GRA

N85-17305# ITT Aerospace/Optical Div., Fort Wayne, Ind.
STUDY IN SPURIOUS SENSITIVITY OF ELECTRONICS IN SPACE Quarterly Report, 1 Apr. - 30 Jun. 1984
David M. Yeager 26 Jun. 1984 5 p
(Contract F49620-83-C-0153; AF Proj. 2301)
(AD-A148386; AFOSR-84-1020TR; QR-3) Avail: NTIS HC A02/MF A01 CSCL 17/8

A measurement program in which a proton beam irradiates sensitive electro-optical sensors used in spacecraft systems has been prepared. The progress reported during this period includes device procurement, test setup, laboratory testing and accelerator test preparation. A second set of tests will be scheduled for July at the Harvard Cyclotron. Author (GRA)

N85-17306# Nondestructive Testing Information Analysis Center, San Antonio, Tex.
ULTRASONIC TRANSDUCERS, PERFORMANCE VARIABILITY, DESIGN, AND MANUFACTURING PROCEDURES Progress Report, 17 Jun. 1982 - 15 Aug. 1984
Hegeon Kwun, Gary L. Burkhardt, Cecil M. Teller, Richard T. Smith, and Jerry T. McElroy (Search Unit System, Inc.) Aug. 1984 48 p
(Contract DLA900-84-C-0910)
(AD-A148575; NTIAC-84-1) Avail: NTIS HC A03/MF A01 CSCL 09/1

A study and analysis of the open literature and a survey of military nondestructive inspection (NDI) personnel and facilities were conducted to determine the extent of and the causes for performance variability of ultrasonic transducers and to identify common problem areas encountered in their use. Significant variations in the performance of nominally identical transducers were identified as a major problem area which has reduced the reliability of ultrasonic NDI below a desirable level. Such performance variations are basically caused by the difference in the basic design and manufacturing procedures of transducers between different manufacturers, as well as the lack of adequate quality control by the manufacturers. To improve the reproducibility and the reliability of ultrasonic NDI, the following actions are recommended: (1) rigorous implementation of in-process quality control by transducer manufacturers; (2) generation and implementation of performance specifications; and (3) development of a more detailed transducer classification system. Author (GRA)

N85-17307# Department of the Navy, Washington, D. C.
A TRANSISTOR OSCILLATOR-DOUBLER Patent Application
C. Rauscher, inventor (to Navy) Filed 5 May 1983 31 p
(AD-D011408; US-Patent-Appl-SN-491941) Avail: NTIS HC A03/MF A01 CSCL 09/5

A microwave transistor oscillator/doubler comprising an Field-Effect Transistor with Terminals G, D and S in combination with a coupling network connected to the terminals G, D and S and composed of microstrip lines with lengths equal to a quarter wavelength at the second harmonic of a fundamental frequency. The doubler further comprises a bias circuit for supplying appropriate voltages to the FET terminals, and an impedance coupler for coupling from the FET D-S terminals to a waveguide load. The coupling network optimizes feedback at the second harmonic between the D-S and G-S ports of the FET to prevent destructive harmonic feedback interaction with the desired signal while providing optimum conditions for feedback at the fundamental frequency. The bias circuit is connected to the coupling network and includes a second network of transmission line elements of lengths equal to a quarter wavelength at the fundamental in order to prevent dissipation of the fundamental frequency therein.
Author (GRA)

N85-17308# Department of the Navy, Washington, D. C.
LOOP RADIATING ELEMENTS Patent Application
C. A. Golt, Jr., J. W. Cassen, and H. E. Schrank, inventors (to Navy) Filed 3 Nov. 1983 10 p
(AD-D011409; US-Patent-Appl-SN-548468) Avail: NTIS HC A02/MF A01 CSCL 09/5

This patent application provides a suspension mount for a gyro sensor block suspension; eliminates dither cross-talk in a gyro triad having a set of common gyros with the same dither tuned suspension. A sensor block has three gyro mount locations situated such that, when attached, the gyro triad is mutually orthonogal to each other. Two of the gyro mount locations have a spring suspension, each of a different stiffness, formed by joining a central hub, to which the gyro is attached, with the sensor block mass via a plurality of spokes to form a torsional spring about the gyro dither axis. GRA

N85-17309# Department of the Navy, Washington, D. C.
A SCANNING ALARM ELECTRONIC PROCESSOR Patent Application
R. A. Stutler, inventor (to Navy) Filed 5 Jul. 1984 21 p
(AD-D011419; US-Patent-Appl-SN-628093) Avail: NTIS HC A02/MF A01 CSCL 09/3

A scanning alarm electronic processor (hereinafter SAEP) for receiving and evaluating a predetermined number of analog signals is configured to perform, inter alia, high speed/high resolution analog computations thereon using micro-programmable methods and devices. The SAEP uses unique, parallel pipeline processing of certain functions to obtain the desired high sample rates. The SAEP is divided into two sections which contribute to its high speed performance. Each section contains the circuitry; i.e., modules, necessary to perform the algorithms for half of the predetermined number of analog signals. A common central processing unit module ties the two sections together. The SAEP operates to compute a droop compensated differential voltage for each one of the predetermined number of analog signals, to compute a weighted sum of the differential voltages, and to compare the weighted sum with an absolute value and perform an alarm evaluation. Author (GRA)

N85-17310# Department of the Air Force, Washington, D.C.
MINIATURE HIGH PERFORMANCE PULSED MODULATOR APPARATUS Patent Application
W. E. Milberger, inventor (to Air Force) Filed 22 Aug. 1984 13 p

(AD-D011427; US-Patent-Appl-SN-643201) Avail: NTIS HC A02/MF A01 CSCL 09/5

A pulsed modulator apparatus having a ground deck clock driver unit to provide pulse stretching and on-off trigger signals for a floating deck transistor switch unit. Voltage isolation is achieved between the ground and floating deck units through the use of trigger transformers. Author (GRA)

N85-17311# Department of the Air Force, Washington, D.C.
DATA ACQUISITION CHANNEL APPARATUS Patent Application
C. H. Higgins, inventor (to Air Force) Filed 3 Jul. 1984 24 p
(AD-D011428; US-Patent-Appl-SN-627691) Avail: NTIS HC A02/MF A01 CSCL 09/5

A hybrid integrated circuit data acquisition channel apparatus employing an operational amplifier fed by a low current differential bipolar transistor preamplifier having separate feedback gain and signal gain determining elements and providing an amplified signal output to a sample and hold and analog-to-digital converter circuits. The disclosed apparatus operates with low energy and small space requirements and is capable of operation without the sample and hold circuit where the nature of the applied input signal permits. Author (GRA)

N85-17312# Department of the Air Force, Washington, D.C.
HIGH EFFICIENCY ELECTRON BEAM GUN FOIL SUPPORT Patent Application
J. P. OLoughlin, inventor (to Air Force) Filed 17 Oct. 1984 26 p
(AD-D011434; US-Patent-Appl-SN-661549) Avail: NTIS HC A03/MF A01 CSCL 09/1

The reduction of the grazing angle of electron is an electron gun with a cathode emitting a beam of electrons which pass through a thin foil into a chamber is accomplished by geometrically tailored electron gun foil supports. One embodiment of the invention replaces the conventional rectangular shaped ribs with a set of triangular shaped ribs which produce a grazing angle. Another embodiment of the tailored foil supports entails the addition of triangular shaped caps to existing rectangular shaped ribs. The resultant reduction of the grazing angle of electrons improve the transmission efficiency of the electron gun and reduces the heat buildup on the supports and foil. GRA

N85-17313# Utah Univ., Salt Lake City. Dept. of Chemistry.
VOLTAMMETRY AND COULOMETRY WITH IMMERSED THIN LAYER ELECTRODES. PART 1: MODEL FOR EFFECTS OF SOLUTION RESISTIVITY IN LINEAR SWEEP VOLTAMMETRY
A. S. Hinman, S. Pons, and J. Cassidy 28 Nov. 1984 23 p
(Contract N00014-83-K-0470)
(AD-A148655; TR-30-Pt-1) Avail: NTIS HC A02/MF A01 CSCL 07/4

In non-aqueous solvent/electrolyte systems, solution resistivities as high as 3000 ohm-cm may be encountered. The resulting potential distribution problems are particularly severe, and it was suggested that implementation of thin layer methodology, even in solvents of relatively high dielectric constant, such as acetonitrile or dimethylformamide, would be difficult. It is in such poorly conducting media that the advantages of thin-layer methodology may often be most beneficial, however. In this paper the application of thin layer voltammetry in non-aqueous media is considered. The discussion is centered around immersed thin layer electrodes, i.e., those in which the edges of the thin layer cavity are immersed in bulk solution, since a greater cross sectional area is available for the flow of current, and the resulting potential distribution is therefore less severe. Such cell designs always suffer to some extent from diffusion of electroactive material from the bulk solution into the thin layer cavity, but it will be demonstrated experimentally that this does not seriously affect the usefulness of results. GRA

N85-17314# Utah Univ., Salt Lake City. Dept. of Chemistry.
VOLTAMMETRY AND COULOMETRY WITH IMMERSED THIN LAYER ELECTRODES. PART 2: PRACTICAL CONSIDERATIONS AND EXPERIMENTAL RESULTS
A. S. Hinman, S. Pons, and J. Cassidy 28 Nov. 1984 16 p
(Contract N00014-83-K-0470)
(AD-A148656; TR-31-Pt-2) Avail: NTIS HC A02/MF A01 CSCL 07/4

We have shown that geometrical considerations in the design of immersed thin layer electrochemical cells are important in the satisfactory performance of voltammetric experiments in solutions of high specific resistivity. In this paper, practical cell design and experimental results for a variety of systems are considered. In summary, we feel that reasonable care in the design of thin layer cells leads to the quantitative use of voltammetry and coulometry in systems with high specific resistivities. In the end, the effort is not much more than that required for conventional cyclic voltammetry, whereas the advantages of analysis using thin layer techniques are greater than those in conventional voltammetry. GRA

N85-17315# Oak Ridge National Lab., Tenn. Fusion Engineering Design Center.
HIGH-PERFORMANCE TF COIL DESIGN FOR THE TOROIDAL FUSION CORE EXPERIMENT (TFCX)
Vishnu C. Strivastava 1984 4 p refs Presented at the Appl. Superconductivity Conf., San Diego, Calif., 9 Sep. 1984
(Contract DE-AC05-84OR-21400)
(DE85-001127; CONF-840937-7) Avail: NTIS HC A02/MF A01

The Toroidal Fusion Core Experiment (RFCX) is a proposed concept for an ignited, long-pulse, current-driven Tokamak device. The TF coil winding cross section in the inboard region is impacted by peak field 10 T, winding current density approx. 3500 A/cm(2), and peak nuclear heating rates 50 mW/cc. The winding utilizes a Nb3Sn internally cooled cable superconductor (ICCS), which is a modified version of the conductor used in the Westinghouse LCP coil. These modifications include the increase of void fraction from 32% to 41% of the cable space for withstanding higher nuclear heating rates and a thicker conduit wall to carry larger magnetic loads. The critical current of an Nb3Sn conductor is strongly dependent on strain in the superconducting strands. The strain in strands is lower when the windings are: (1) wound and then reacted (W/R), as compared to (2) reacted and then wound (R/W). The impact of these approaches on winding performance is discussed. The windings are pancake wound and cooled with supercritical helium. The LHe inlet (approx. 4 K) and outlet (approx. 5.5 K) connections are located on the sides of the TF coils. The conductor design, the winding design, and performance analysis are described. DOE

N85-17316# European Space Agency, Paris (France).
EVALUATION OF TEST EQUIPMENT FOR THE DETECTION OF CONTAMINATION ON ELECTRONIC CIRCUITS
C. G. Bergendahl (Swedish Institute of Production Engineering Research) and B. D. Dunn (ESTEC, Noordwijk, Netherlands) Aug. 1984 72 p refs Sponsored by ESTEC
(ESA-STM-234; ISSN-0379-4075) Avail: NTIS HC A04/MF A01

The reproducibility, sensitivity and ease of operation of test equipment for the detection of ionizable contaminants on the surface of printed circuit assemblies were assessed. The characteristics of the test equipment are described. Soldering fluxes were chosen as contaminants and were applied in controlled amounts to printed-circuit board assemblies possessing two different component populations. Results show that the relationship between equipment readings varies with flux type. Each kind of test equipment gives a good measure of board cleanliness, although reservations exist concerning the interpretation of such results. A test method for the analysis of total (organic and inorganic) halides in solder fluxes is presented. Author (ESA)

N85-16733# Naval Surface Weapons Center, Dahlgren, Va.
JOINT SERVICE DESIGN FOR TESTABILITY PROGRAM
W. L. Keiner *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 5 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-16738# Dowty Electronics Ltd., London (England). Controls Div.
EXPERIENCE OF ONE UK ELECTRONIC EQUIPMENT SUPPLIER WITH BITE ON ENGINE/FLIGHT CONTROL SYSTEMS OVER THE PAST TEN YEARS
Raymond deGaye *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 18 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-16742# Institut de Mathematiques Appliquees de Grenoble (France).
DESIGN OF SELF-CHECKING N-MOS (H-MOS) INTEGRATED CIRCUITS
M. Nicolaidis and B. Courtois *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 20 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-17181# Joint Publications Research Service, Arlington, Va.
ELECTRONICS COMPONENT R AND D, PRODUCTION CAPABILITY REVIEWED
Hans-Friedrich Hadamovsky *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 36-39 Transl. into ENGLISH from Spectrum (East Berlin), v. 15, no. 9, 1984 p 9-10 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

N85-17200# Joint Publications Research Service, Arlington, Va.
CHEMICAL, MATERIAL ELECTRONICS STUDIES ESTABLISHED
Lubomir Hudec *In its* USSR Rept.: Sci. and Technol. (JPRS-ESA-84-043) 3 Dec. 1984 p 5-6 Transl. into ENGLISH from Rude Pravo (Prague), 3 Oct. 1984 p 4 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

N85-17202# Joint Publications Research Service, Arlington, Va.
GENERAL ASSESSMENT OF GDR MICROELECTRONICS INDUSTRY, APPLICATIONS
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-043) 3 Dec. 1984 p 16-21 Transl. into ENGLISH from Presse-Inform. (East Berlin), no. 110, 20 Sep. 1984 p 1-11 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

N85-17888*# Max-Planck-Inst. fuer Radioastronomie, Bonn (West Germany).
TUNABLE HETERODYNE RECEIVER FROM 100 MICRON TO 1,000 MICRON FOR AIRBORNE OBSERVATIONS
H. P. Roeser, R. Wattenbach, and P. vanderWal *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 330-334 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N85-17317 United Kingdom Atomic Energy Authority, Dounreay (Scotland).
EXPERIMENTAL INVESTIGATION OF THE OSCILLATION BEHAVIOUR OF A LIQUID-FILLED ROTOR WITH CENTRIFUGAL MOTION
G. Lichtenberg Aug. 1984 13 p refs Transl. into ENGLISH from VDI Berichte (West Germany), no. 381, 1980 p 161-166 (BLL-Dounreay-Tr-936-(9091.9F)) Avail: British Library Lending Div., Boston Spa, England

In a rotor partially filled with liquid, unstable oscillations appear in the upper critical velocity regime which are attributable to the basic oscillation of the free surface of the liquid. The basic oscillation was detected experimentally by a conductivity wave level measuring method. The boundaries of the unstable velocity regime are dependent on the amount of filling liquid. On the other hand, the critical velocity of the partially filled rotor remains constant for all liquid quantities. The values recorded in the experiments correspond to the calculated values to which the determination of the mass and the moment of inertia of the rotor is such that the corresponding values for the total volume filled with liquid were experimental rotors, cannot be generalized without additional investigation. Author

N85-17318 Harvard Univ., Cambridge, Mass.
NUMERICAL MODELING OF STEADY, LAMINAR FREE-CONVECTIVE BOUNDARY LAYER FLOW BENEATH HEATED OR COMBUSTING HORITZONAL SURFACES Ph.D. Thesis
David Elliot Keyes 1984 287 p
Avail: Univ. Microfilms Order No. DA8419366

The system of equations describing free-convective fluid flow is complicated by the cross-coupling of the transport of momenum and internal energy: the buoyancy force is the driving term in the momentum equations, yet it arises from a temperature distribution which is dominated by convection. Variable density flows regardless of configuration are additionally complicated by the presence of high frequency modes, sound waves and gravity waves, which, though irrelevent to the computation of the steady state solution, cause customary numerical procedures to be intolerably inefficient unless they are selectively suppressed. A numerical method designed to overcome these difficulties is presented, and its use in solving the diffusion flame problem of a freely burning ceiling is illustrated. Dissert. Abstr.

N85-17319 Virginia Polytechnic Inst. and State Univ., Blacksburg.
A 3-DIMENSIONAL TURBULENT BOUNDARY LAYER UPSTREAM AND AROUND A JUNCTION VORTEX FLOW Ph.D. Thesis
John Dante Menna 1984 475 p
Avail: Univ. Microfilms Order No. DA8421879

A pressure driven three dimensional turbulent boundary layer flow upstream and around a junction vortex was experimentally studied and is offered for use as a benchmark flow for testing and evaluating the predictive ability of state-of-the-art three dimensional turbulent boundary layer codes. The pressure driven flow and junction vortex system was generated by a streamlined cylinder placed normal to a flat surface. Measurements of wall static pressure, wall shear stress, mean velocity, and Reynolds stress tensor field are reported at several stations in the three-dimensional turbulent boundary layer region. Documentation of the flow edge conditions is provided as well as upstream initial conditions along a plane with measured mean velocity and Reynolds stress tensor to permit the testing of intermediate and higher order turbulence models. Dissert. Abstr.

N85-17320 Virginia Polytechnic Inst. and State Univ., Blacksburg.
APPLICATION OF THE VORTEX-LATTICE CONCEPT TO FLOWS WITH SMOOTH-SURFACE SEPARATION Ph.D. Thesis
David Fred Thrasher 1984 127 p
Avail: Univ. Microfilms Order No. DA8421896

A nonlinear three dimensional vortex lattice method which treats the steady separated flow over prolate bodies with open separation moving through an inviscid incompressible fluid is developed. The strength and position of the body wake are found as part of the solution. Specifically, flows with smooth surface separation are considered as opposed to flows with sharp edge separation treated with the vortex lattice concept in the past. To demonstrate the technique, results for the flow over an inclined ogive cylinder are presented. In the case of separated flow, comparisions of the results of the vortex-lattice method are made with experimental data and with the results of a typical two dimensional analogy. The results demonstrate that the present method agrees most

favorably with the experimental data windward of a separation line. Dissert. Abstr.

N85-17321 Texas Univ., Austin.
ANALYSIS OF A PENALTY FINITE ELEMENT APPROXIMATION OF THE NAVIER STOKES EQUATIONS Ph.D. Thesis
Ramachander Krishnan 1984 234 p
Avail: Univ. Microfilms Order No. DA8421744

The analysis of a penalized formulation of the Navier-Stokes equations is considered. First, the existence of a unique solution (under certain sufficient conditions on the viscosity and body force) is proved. After similar considerations for the reduced integration penalty finite element problem, error estimates for the velocity and pressure approximations are derived. Next, the convergence of several standard iterative methods for the solution of the nonlinear algebraic system arising from the approximate problem is considered. Finally, the application of continuation methods for extending the range of flows at which convergence can be achieved is studied. Dissert. Abstr.

N85-17322*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AEROTHERMAL TESTS OF A 12.5 PERCENT CONE AT MACH 6.7 FOR VARIOUS REYNOLDS NUMBERS, ANGLES OF ATTACK AND NOSE SHAPES
Robert J. Nowak, Cindy W. Albertson, and L. Roane Hunt Jan. 1984 90 p refs
(NASA-TP-2345; L-15729; NAS 1.60:2345) Avail: NTIS HC A05/MF A01 CSCL 20D

The effects of free-stream unit Reynolds number, angle of attack, and nose shape on the aerothermal environment of a 3-ft basediameter, 12.5 deg half-angle cone were investigated in the Langley 8-foot high temperature tunnel at Mach 6.7. The average total temperature was 3300 R, the freestream unit Reynolds number ranged from 400,000 to 1,400,000 per foot, and the angle of attack ranged from 0 deg to 10 deg. Three nose configurations were tested on the cone: a 3-in-radius tip, a 1-in-radius tip on an ogive frustum, and a sharp tip on an ogive frustum. Surface-pressure and cold-wall heating-rate distributions were obtained for laminar, transitional temperature in the shock layer were obtained. The location of the start of transition moved forward both on windward and leeward sides with increasing free-stream Reynolds numbers, increasing angle of attack, and decreasing nose bluntness. R.S.F.

N85-17323*# OAO Corp., Greenbelt, Md.
CAPILLARY PUMP LOOP (CPL) HEAT PIPE DEVELOPMENT STATUS REPORT
Aug. 1982 6 p
(Contract NAS5-26660)
(NASA-CR-175273; NAS 1.26:175273) Avail: NTIS HC A02/MF A01 CSCL 20D

The capillary pump loop (CPL) was re-introduced as a potential candidate for the management of large heat loads. It is currently being evaluated for application in the thermal management of large space structures. Test efforts were conducted to establish the feasibility of the CPL heat pipe design. B.G.

N85-17324*# Wisconsin Univ., Milwaukee. Dept. of Mechanical Engineering.
A STUDY OF REYNOLDS-STRESS CLOSURE MODEL Semiannual Progress Report, 1 Jun. 1984 - 15 Jan. 1985
R. S. Amano and P. Goel Jan. 1985 50 p refs
(Grant NAG3-546)
(NASA-CR-174342; NAS 1.26:174342) Avail: NTIS HC A03/MF A01 CSCL 20D

A hybrid model of the Reynolds stress closure was developed. This model was tested for various sizes of step flow, and the computed Reynolds stress behavior was compared with experimental data. The third order closure model was reviewed. Transport equations for the triple velocity correlation were developed and implemented in a numerical code to evaluate the behavior of the triple velocity products in various regions of the flow field including recirculating, reattaching, and redeveloping flow domains. B.G.

N85-17325*# Continuum, Inc., Huntsville, Ala.
COMPUTATIONAL FLUID MECHANICS UTILIZING THE VARIATIONAL PRINCIPLE OF MODELING DAMPING SEALS Interim Report
J. Michael Abernathy and Richard Farmer 7 Feb. 1985 26 p refs Original contains color illustrations
(Contract NAS8-35508)
(NASA-CR-174332; NAS 1.26:174332; CI-IR-0080) Avail: NTIS HC A03/MF A01 CSCL 20D

An analysis for modeling damping seals for use in Space Shuttle main engine turbomachinery is being produced. Development of a computational fluid mechanics code for turbulent, incompressible flow is required. Author

N85-17326 Admiralty Marine Technology Establishment, Teddington (England).
THE STABILITY OF AN INFINITE ELASTIC PIPE WITH UNIFORM MEAN FLOW
E. A. Skelton Feb. 1984 43 p refs
(AD-A146686; AMTE(N)-TM-84057; BR92675) Copyright. Avail: NTIS HC A03/MF A01 CSCL 20/4

A pipe conveying incompressible fluid is modeled using linear beam theory. The stability of the system is analyzed using a causal approach which can distinguish between absolute and convective instabilities. Closed-form expressions for the stability boundaries of the beam theory model are derived analytically. The dissipation-free pipe is absolutely unstable if the ratio of the mass per unit length of the pipe to that of the contained fluid is greater than one-eighth, otherwise it is convectively unstable at low excitation frequencies and stable at high frequencies. The pipe is found to be absolutely unstable when damping is included. Numerical results for a steel pipe and a rubber pipe, both of which contain water are presented. Author (ESA)

N85-17327# Ballistic Research Labs., Aberdeen Proving Ground, Md.
CHARACTERIZATION OF JET-CONTAMINANT INTERACTION FLOW IN CHEMICAL DECONTAMINATION
L. M. Chang Sep. 1984 74 p
(DA Proj. 1L1-61102-A-71-A)
(AD-A147298; AD-F300485; BRL-TR-2588) Avail: NTIS HC A04/MF A01 CSCL 20/4

A numerical simulation and study are presented for characterization of the flow interaction of a water jet with a chemical contaminant droplet on a plane wall, which occurs in chemical decontamination processes. Two models are developed for this analysis, namely, one-fluid flow and two-fluid flow, both governed by the two-dimensional Navier-Stokes equations. Emphases of the study are on the evolution of the contaminant droplet and the effects of various flow parameters. Computer plots of the movement of the droplet are present. Computed results show that a jet impingement at 45-60 degrees from the contaminated wall can perform in the most effective and most efficient way in displacing the contaminant. The results also show that an increase in the jet velocity or the cross-sectional area of the jet can greatly improve the cleaning power. However, for a given jet flow rate, it is more advantageous to adopt a jet spray composed of a number of small high-speed jets than one consisting of a single large low-speed jet. The jet-contaminant interactions taking place in confined geometries, such as cavities and corners of two perpendicular walls, are also examined. We have found that an inclined jet is more effective than a normal jet for decontaminating such geometries. In all of the flow cases studied, the impact pressure on the impingement wall far exceeds the steady-state stagnation pressure of the jet. GRA

N85-17328# Harry Diamond Labs., Adelphi, Md.
DESIGN GUIDE FOR FLUIDIC LAMINAR PROPORTIONAL AMPLIFIERS AND LAMINAR JET ANGULAR RATE SENSORS
J. W. Joyce Sep. 1984 81 p Sponsored by Army

(AD-A147730; HDL-SR-84-6) Avail: NTIS HC A05/MF A01 CSCL 20/4

This report provides technical information on the design, performance, and fabrication of fluidic laminar proportional amplifiers and laminar jet angular rate sensors (LJAR's). Standard amplifier designs and formats are presented which allow the use to select amplifier characteristics most suitable for each specific application. Various methods for fabricating elements are described, and information relating to the effects of fabrication inaccuracies are presented in this report. The LJARS is described, and the advantages of applying laminar fluidics to the vast field of sensors are shown. Several circuit arrangements and the performance achieved with these circuits are presented. Charts and other reference material are also included. Author (GRA)

N85-17329# Technion - Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.

EVOLUTION OF NONLINEAR WAVE GROUPS ON WATER OF SLOWLY-VARYING DEPTH Periodic Report, Mar. - Aug. 1984

R. Iusim and M. Stiassnie Oct. 1984 14 p

(Contract DAJA37-82-C-0300; DA Proj. 1T1-61102-BH-57)

(AD-A147947; PR-6) Avail: NTIS HC A02/MF A01 CSCL 12/1

Third order evolution equation for groups of water-waves moving over an uneven bottom were first derived by Djordjevic and Redekopp (1978). This report carries their derivation one step farther, to fourth order, utilizing the REDUCE 2 algebraic manipulator (after Hearn, 1973). Author (GRA)

N85-17330# Manchester Univ. (England). Dept. of Mechanical Engineering.

COMPUTATION OF FLOW AND HEAT TRANSFER IN FLOW AROUND A 180 DEG BEND Annual Report, 1 Nov. 1982 - 31 Oct. 1983

B. E. Launder, H. Iacovides, R. W. Johnson, J. A. C. Humphrey, and J. W. Baughn Apr. 1984 94 p

(Contract N00014-83-G-0021; NR Proj. 097-449)

(AD-A148065) Avail: NTIS HC A05/MF A01 CSCL 20/4

During 1982-83 work progressed on four separate fronts corresponding to both experimental and computational aspects of turbulent flow in 180 bends for both square and round tubes. The design and construction of the apparatus was described in some detail in last year's Annual Report. The radius of the bend was 3.35 times the duct hydraulic diameter (DH), the width of the duct walls being 88.9 mm. Up to 70 hydraulic diameters of flow development were available prior to the bend but the main emphasis of the experiments was directed at the case of 31 DH which corresponded with the conditions at which the UC Berkeley flow field data had been taken. Downstream of the bend 40 hydraulic diameters of instrumented straight ducting allowed the effects of decaying secondary flow to be studied. GRA

N85-17331# Massachusetts Inst. of Tech., Cambridge. Acoustics and Vibration Lab.

COMPARISON OF TECHNIQUES TO MEASURE THE LOW WAVENUMBER WALL PRESSURE SPECTRUM OF A TURBULENT BOUNDARY LAYER Final Progress Report

Kyle F. Martini, P. Leehey, and M. Moeller Aug. 1984 190 p

(Contract N00014-82-K-0728)

(AD-A148074; A/V-92828-1) Avail: NTIS HC A09/MF A01 CSCL 20/4

The agreement between low wavenumber measurements of the turbulent wall pressure spectrum by various investigators has not been too good. Different techniques have been used in different facilities and have yielded data in different nondimensional frequency and wavenumber ranges. The current measurement program has utilized the wavenumber filtering techniques used by three primary investigators, the Martin plate, the Jameson plate and the Farabee and Geib 6-element microphone array in the same facility. Also a 12-element collinear and stagger array and a lateral array were used. The agreement between the different techniques in the M.I.T. facility is generally good. In addition, the difference of results between facilities has been reduced by displaying the data in a non-dimensional form that does not include the effect of boundary layer thickness. However, there was still a significant scatter in the data for each technique. Scatter is believed to be due to variation of each filter's wavenumber response away from the main acceptance lobe where the filter is responding to the acoustic and convective contamination and also the variation of the contamination with flow speed. GRA

N85-17332# Mississippi Univ., University. Physical Acoustics Research Lab.

THE ROLE OF NUCLEI SIZE IN TRANSIENT CAVITATION THRESHOLD MEASUREMENTS

R. A. Roy and L. A. Crum 1 Sep. 1984 89 p

(Contract N00014-84-C-0193)

(AD-A148334; TR-2-84) Avail: NTIS HC A05/MF A01 CSCL 20/4

The relationship between cavitation nuclei size and transient cavitation thresholds was studied employing an apparatus designed to perform automated threshold measurements using sound emission and sonoluminescence as transient cavitation indicators. Experimental results agree with crevice model predictions based on either the crevice or free bubble nucleation models. Observed deviations may be due to limitations in the theories or systematic experimental errors. Author (GRA)

N85-17333# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Applied Mechanics.

SECONDARY FLOW IN CASCADES Final Scientific Report, 1 Jul. 1980 - 31 Dec. 1983

A. Hamed Jun. 1984 83 p

(Grant AF-AFOSR-0242-80)

(AD-A148415; UC-ASE-AH-101; AFOSR-84-0912TR) Avail: NTIS HC A05/MF A01 CSCL 20/4

This report covers research work to investigate the secondary flow phenomena in internal flow fields analytically and experimentally. Its main objective was to develop computational procedures for internal three-dimensional rotational flow fields and to obtain experimental measurements of the three velocity components of the rotational flow in a curved duct with shear inlet velocity profile. Two formulations were developed for modeling inviscid three dimensional rotational flow fields in curved passages. The first, for a very efficient marching solution with hyperbolic equations governing the development of through flow velocity and vorticity profiles along the duct. In the second formulation, a new approach was developed to satisfy the conservation of mass in three dimensional flows by defining two dimensional streamlike functions on fixed orthogonal surfaces in the flow field. The streamlike function vorticity formulation was also tested for its ability to model viscous flow effects and their elliptic influence in a square duct. GRA

N85-17334# Stanford Univ., Calif. High Temperature Gasdynamics Lab.

ADVANCED DIAGNOSTICS FOR REACTING FLOWS Annual Report, 1 Oct. 1982 - 30 Sep. 1983

R. K. Hanson, D. Baganoff, C. T. Bowman, R. L. Byer, and B. J. Cantwell Nov. 1983 81 p

(Contract F49620-83-K-0004)

(AD-A148479; AFOSR-84-1072TR) Avail: NTIS HC A05/MF A01 CSCL 20/4

Progress is reported for the third year of an interdisciplinary program to innovate modern diagnostic techniques for application to reacting flows. Project areas are: (1) fiber optic absorption/fluorescence probes for species measurements employing tunable ultraviolet, visable and infrared laser sources; (2) wavelength modulation spectroscopy, using rapid-scanning ultraviolet, visible and infrared laser sources, for measurements of species, temperature and absorption lineshapes, (3) quantitative flow visualization, including temporally and spatially resolved species measurements in a plane, using laser-induced fluorescence; (4) multiple-point velocity visualization; (5) plasma diagnostics, utilizing planar laser-induced fluorescence and wavelength modulation techniques; (6) diagnostic techniques for thermionic converter plasmas; (7) application of advanced diagnostic techniques for studies of

turbulent reacting flows; (8) development of measurement techniques and a novel facility for investigations of droplet evaporation in turbulent flows; (9) holographic display techniques for 3-D visualization of flowfield data; (10) coherent anti-Stokes Raman spectroscopy (CARS) for temperature and velocity measurements in a supersonic jet; and (11) computed absorption tomography system for species measurements in a plane. GRA

N85-17335# Ballistic Research Labs., Aberdeen Proving Ground, Md.
A VAN LEER SHOCK CAPTURING ALGORITHM FOR THE EULER EQUATIONS Final Report
C. H. Cooke Oct. 1984 37 p
(DA Proj. 1L1-61102-AH-43)
(AD-A148761; AD-F300513; BRL-MR-3400) Avail: NTIS HC A03/MF A01 CSCL 20/4

Van Leer's second-order accurate sequel to the first-order method of Godunov, originally formulated in the framework of Lagrangean fluid dynamics, is revised so as to apply to numerical calculation of solutions to the one-dimensional Euler equations of compressible flow. Comparisons of performance between the first and second order method are shown for the linear shock tube problem. Use of artificial viscosity, as opposed to oscillation limiting, is discussed. GRA

N85-17336# New York Univ., New York. Inst. of Mathematical Sciences.
FRONT TRACKING FOR GAS DYNAMICS
I.-L. Chern (Academia Sinica, Taiwan), J. Glimm, O. McBryan, B. Plohr, and S. Yaniv May 1984 53 p refs
(Contracts DE-AC02-76ER-03077; DAAG29-83-K-0007; Grant NSF MCS-82-07965)
(DE85-000571; DOE/ER-03077/223) Avail: NTIS HC A04/MF A01

Front tracking is an adaptive computational method in which a lower dimensional moving grid is fitted to and follows the dynamical evolution of distinguished waves in a fluid flow. The method takes advantage of known analytic solutions, derived from the Rankine-Hugoniot relations, for idealized discontinuities. The method is applied to the Euler equations describing compressible gas dynamics. The main thrust is validation of the front tracking method: results are presented on a series of test problems for which comparison answers can be obtained by independent methods. DOE

N85-17337# California Univ., Berkeley. Lawrence Berkeley Lab. Earth Sciences Div.
STEADY FLOW MODEL USER'S GUIDE
C. Doughty, G. Hellstrom, C. F. Tsang, and J. Claesson (Lund Inst. of Technology) Jul. 1984 47 p refs
(Contract DE-AC03-76SF-00098)
(DE85-002001; LBL-PUB-3044) Avail: NTIS HC A03/MF A01

Sophisticated numerical models that solve the coupled mass and energy transport equations for nonisothermal fluid flow in a porous medium were used to match analytical results and field data for aquifer thermal energy storage (ATES) systems. As an alternative to the ATES problem the Steady Flow Model (SFM), a simplified but fast numerical model was developed. A steady purely radial flow field is prescribed in the aquifer, and incorporated into the heat transport equation which is then solved numerically. While the radial flow assumption limits the range of ATES systems that can be studied using the SFM, it greatly simplifies use of this code. The preparation of input is quite simple compared to that for a sophisticated coupled mass and energy model, and the cost of running the SFM is far cheaper. The simple flow field allows use of a special calculational mesh that eliminates the numerical dispersion usually associated with the numerical solution of convection problems. The problem is defined, the algorithm used to solve it are outlined, and the input and output for the SFM is described. DOE

N85-17338# Oxford Univ. (England). Dept. of Engineering Science.
SUBCOOLED FLOW BOILING AT HIGH HEAT FLUX
Victor H. DelValleM and D. B. R. Kenning 1984 42 p refs Sponsored by UK Science and Engineering Research Council, UKAEA, and Consejo Nacional de Ciencia y Technologia
(OUEL-1540/84) Avail: NTIS HC A03/MF A01

Subcooled flow nucleate boiling of water at atmospheric pressure on stainless steel was studied. The heat transfer coefficient increases with increasing subcooling and also with increasing wall thickness over the range 0.08 to 0.20 mm. Bubble size, frequency, and the distribution of nucleation sites were measured at 1.7 m/sec inlet velocity, 80 C subcooling, 0.08 mm wall thickness, and heat fluxes 70% to 95% of the critical flux. The observations are consistent with a model for heat transfer primarily by surface quenching at the bubble frequency, supplemented by single-phase convection and a small contribution from microlayer evaporation. Although the total population of nucleation sites increases with increasing wall superheat, the start-up of new sites deactivates sites active at lower superheat. Author (ESA)

N85-17339# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
UNSTEADY FREE-CONVECTION HEAT TRANSFER INSIDE AN ANNULAR CAVITY Ph.D. Thesis
Alfredo CastrejonNava Aug. 1984 258 p refs Sponsored by National Univ. of Mexico
(CFD-84/16) Avail: NTIS HC A12/MF A01

Two-dimensional, unsteady, free-convection heat transfer between horizontal concentric cylinders was studied. Photographs and qualitative descriptions of the flow patterns obtained for various operation conditions of temperature difference between cylinders are presented. The unsteady flow patterns predicted by the finite-domain solution are compared with photographs of the flow and good qualitative agreement is found. The mathematical model is used to obtain data on transient temperature profiles, velocity fields, and flow patterns for a variety of Rayleigh numbers, diameter ratio, and Prandtl numbers. Author (ESA)

N85-17340# Technische Hogeschool, Delft (Netherlands). Fluid Dynamics Research Group.
NUMERICAL EXPERIMENTS AND THEORETICAL ANALYSIS OF THE FLOW OF AN ELASTIC LIQUID OF THE MAXWELL-OLDROYD TYPE IN THE PRESENCE OF GEOMETRICAL SINGULARITIES
J. vanderZanden, G. D. C. Kuiken, A. Segal, W. J. Lindhout, and M. A. Hulsen May 1984 48 p refs Submitted for publication
(WTHD-164) Avail: NTIS HC A03/MF A01

The Maxwell-B model of an elastic liquid was chosen for finite element calculations with the penalty method of the plane flow over a slot. Increasing oscillations in the solution propagate in an upstream direction for increasing Deborah number (De) (proportional to the relaxation time of the liquid) and for decreasing mesh size until the algorithm fails to converge. A singularity exists near geometrical singularities. The complete set of equations is of a mixed hyperbolic-elliptic type and cannot be solved by global methods. The Jeffreys-Oldroyd-B models give a set of parabolic equations, resembling the problematic convection-diffusion equations. The equations governing the plane flow of a liquid of the second degree are of mixed hyperbolic-elliptic type: the particle trajectories are characteristics. Stable solution schemes for arbitrary values of De are illustrated. Author (ESA)

N85-17341# Delft Hydraulics Lab. (Netherlands).
WEAKLY-REFLECTIVE BOUNDARY CONDITIONS FOR TWO-DIMENSIONAL SHALLOW WATER FLOW PROBLEMS
G. K. Verboom and A. Slob Jul. 1984 15 p refs Presented at 5th Intern. Conf. on Finite Elements in Water Resources, Burlington, Vt., Jun. 1984
(Publ-322) Avail: NTIS HC A02/MF A01

Weakly-reflective boundary conditions are derived for the two-dimensional shallow water equations, including bottom friction and Coriolis force. Zero and first order approximations are applied to the test problem of an initially Gaussian-shaped free surface

elevation. Numerical implementation of a finite element program used for the solution is discussed. For small scale practical problems a one parameter formulation might be sufficient. The influence of this parameter on the weakly-reflectiveness of the boundary condition is discussed. Author (ESA)

N85-16779# Naples Univ. (Italy).
TURBULENT BUBBLES BEHIND AIRFOILS AND WINGS AT HIGH ANGLE OF ATTACK
V. Losito and G. Torella *In* AGARD Improvement of Aerodynamic Performance Through Boundary Layer Control and High Lift Systems Aug. 1984 13 p refs (For primary document see N85-16771 08-01)
Avail: NTIS HC A18/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N85-17342 National Physical Lab., Teddington (England). Div. of Materials Applications.
RECOMMENDATIONS FOR THE USE OF Ni-Cr-BASE ALLOY EXTENSOMETERS FOR MEASUREMENT OF CREEP STRAIN
M. S. Loveday and T. B. Gibbons Jul. 1984 15 p refs
(NPL-DMA(A)81; ISSN-0143-7313) Copyright. Avail: Issuing Activity

Recommendations for the use of extensometers manufactured from Ni-Cr-base alloys for the measurement of creep strains at high temperature are given. Procedures for avoiding or minimizing the effects of dimensional changes associated with the order/disorder transformation that occurs in these alloys are outlined and technical support for the recommendations is provided. Effects due to dimensional changes resulting from precipitation and from thermal fluctuations are compared. Author (ESA)

N85-17343*# Lockheed Missiles and Space Co., Palo Alto, Calif.
A COMETARY ION MASS SPECTROMETER Final Report
E. G. Shelley and D. A. Simpson 15 Nov. 1984 111 p refs
(Contract NASw-3572)
(NASA-CR-174328; NAS 1.26:174328; LMSC/F018835) Avail: NTIS HC A06/MF A01 CSCL 14B

The development of flight suitable analyzer units for that part of the GIOTTO Ion Mass Spectrometer (IMS) experiment designated the High Energy Range Spectrometer (HERS) is discussed. Topics covered include: design of the total ion-optical system for the HERS analyzer; the preparation of the design of analyzing magnet; the evaluation of microchannel plate detectors and associated two-dimensional anode arrays; and the fabrication and evaluation of two flight-suitable units of the complete ion-optical analyzer system including two-dimensional imaging detectors and associated image encoding electronics. A.R.H.

N85-17344*# American Science and Engineering, Inc., Cambridge, Mass.
DESIGN AND FABRICATION OF A CCD CAMERA FOR USE WITH RELAY OPTICS IN SOLAR X-RAY ASTRONOMY Final Report, 1 Jul. 1983 - 30 Sep. 1984
31 Dec. 1984 60 p refs
(Contract NASw-3784)
(NASA-CR-174334; NAS 1.26:174334; ASE-34913) Avail: NTIS HC A04/MF A01 CSCL 14E

Configured as a subsystem of a sounding rocket experiment, a camera system was designed to record and transmit an X-ray image focused on a charge coupled device. The camera consists of a X-ray sensitive detector and the electronics for processing and transmitting image data. The design and operation of the camera are described. Schematics are included. A.R.H.

N85-17345# Honeywell Electro-Optics Center, Lexington, Mass.
HOLOGRAPHIC FLI FOR DETECTION OF DEFECTS Interim Report, 15 Jan. - 1 Jul. 1984
George O. Reynolds, Donald A. Servaes, Luis Ramos, Daniel Pierce (Arthur D. Little, Co.), Ronald Mayville (Arthur D. Little, Co.), Peter Hilton (Arthur D. Little, Co.), and John B. DeVelis (Merrimack College) Jul. 1984 32 p
(Contract F49620-82-C-0001; AF Proj. 2306)
(AD-A148339; Rept-8309-38; AFOSR-84-0976TR) Avail: NTIS HC A03/MF A01 CSCL 20/6

In this interim report, we show that the two-exposure FLI (Frinze linearization interferometry) holographic method is feasible. We describe the series of experiments and mathematical modeling which led to the development of a new test plate fixture, and the introduction of the four-exposure Moire method. We describe how the original two-exposure FLI technique can be utilized by increasing the linear fringe frequency. We describe a two wavelength method for the four-exposure. FLI Moire method leads to a desensitization. The feasibility of an automatic readout for the linear fringe method is demonstrated by showing that observable and measurable effects at the defect site can be monitored. Finally, we outline the remaining program. GRA

N85-17346# Massachusetts Inst. of Tech., Cambridge. Acoustics and Vibration Lab.
DEVELOPMENT OF A FLOATING ELEMENT WALL SHEAR TRANSDUCER Progress Report
S. W. Petri Aug. 1984 103 p
(Contract N00014-78-C-0696)
(AD-A148450; A/V-87144-1) Avail: NTIS HC A06/MF A01 CSCL 14/2

A highly linear passive floating element wall shear transducer has been developed which uses a sensitive frequency modulation technique to measure a capacitance change proportional to the displacement of the floating element for small deflections. The floating element is 4mm square surrounded by a gap nominally 0.18mm and protrudes into the boundary layer 9 micrometer. Scaled on inner parameters, each side of the sensing head measures about 290, the mean gap width is 13, and the element protrusion is 0.7. The transducer was tested in a turbulent boundary layer on a flat plate at momentum thickness Reynolds numbers of 3140, 3500, and 3760 and the results compared to wall shear stress estimates obtained from the law of the wall. The transducer was found to predict the steady mean wall shear stress within the limits of experimental uncertainty in all cases; transducer measurements of mean wall shear stress for momentum thickness Reynolds numbers of 3140 and 3500 were within 2 percent of the actual value. Transducer measurement of the unsteady mean wall shear stress was severely limited by a mechanical resonance in the transducer at 63 Hz. The operating principles and general characteristics of the transducer are discussed, its performance is evaluated, and recommendations are made concerning future work. Author (GRA)

N85-17347# Department of the Navy, Washington, D. C.
A COAXIAL PROBE FOR MEASURING THE CURRENT DENSITY PROFILE OF INTENSE ELECTRON BEAMS Patent Application
R. Fiorito and M. Raleigh, inventors (to Navy) Filed 19 Jun. 1984 18 p
(AD-D011407; US-Patent-Appl-SN-640178) Avail: NTIS HC A02/MF A01 CSCL 14/2

An interceptive type electric probe for mapping the radial current density profile of high energy and high current electron beams comprises, inter alia, an input sensor, an interface support connector and an output support connector. The entire structure of the electric probe is configured to closely approximate a coaxial transmission line of a predetermined impedance that is opened ended but yet shielded. The nature of the construction of the

probe, in terms of materials and techniques, allows for survival thereof in high temperature and intense beam environments. GRA

N85-17348# Spectron Development Labs., Inc., Costa Mesa, Calif.
DEVELOPMENT OF HOLOGRAPHIC PARTICLE FIELD DATA REDUCTION BY FOURIER ANALYSIS Final Report, 13 Feb. - 13 Oct. 1984
J. D. Trolinger and C. F. Hess Wright-Patterson AFB, Ohio AFWAL 14 Aug. 1984 96 p
(Contract F33615-83-C-2372)
(AD-A148684; SDL-84-2338-03F; AFWAL-TR-84-2091) Avail: NTIS HC A05/MF A01 CSCL 14/5

The purpose of this work is to establish the feasibility of using a Fourier transform analysis to automatically extract size distribution from particle field off-axis holograms. Both experimental and theoretical studies were conducted to show that this technique is feasible. A holographic system was designed and built compatible for use with a commercially available Fourier transform analyzer and software. Holograms of a standard particle field were obtained, and scattered light of both the particle field and its hologram were Fourier transform analyzed. The Sauter mean diameter determined by the two methods agreed to within 5%. The experimental and theoretical studies show that the prediction of the size distribution could be improved by increasing the diffraction efficiency of the hologram. This can be accomplished by producing phase holograms. Spray holograms were also Fourier transform analyzed at various locations of the spray. Photographs of the spray are provided for comparison. The results of this phase show that this method will yield very fast analysis of large amounts of holographic data. GRA

N85-17349# Flow Research, Inc., Kent, Wash.
DEVELOPMENT OF A PRESSURE TRANSDUCER FOR USAGE IN HIGH-TEMPERATURE AND VIBRATION ENVIRONMENTS. PHASE 1: FEASIBILITY INVESTIGATION Final Report, 10 Sep. 1983 - 30 Apr. 1984
H. T. Liu, G. Mauer (Washington Univ., Seattle), and P. Zieve Arnold AFS, Tenn. AEDC Nov. 1984 61 p Sponsored by Air Force
(AD-A148695; AEDC-TR-84-30) Avail: NTIS HC A04/MF A01 CSCL 14/2

The objective of the phase 1 project is to determine the feasibility of developing a highly accurate, low range pressure transducer that is suitable for measurement in environments where high vibrations, high temperatures and varying line pressures create problems for presently available transducers. The primary sensor is an elastic metal diaphragm that forms one plate of a capacitor; the other plate is fixed with respect to the diaphragm. An electronic circuit converts the diaphragm deflections, induced by a pressure force, into voltage variations that are then sampled by a microprocessor, which is to be developed in phase 2. Because of the small oscillating mass of the diaphragm, the transducer has a high natural frequency and is largely insensitive to externally induced vibrations. The simple configuration of the capacitive transducer is potentially very large overloads with appropriate installation of an overload stop between the two plates. In comparison with other types of pressure sensors, the capacitive transducer concept offers an unusual amount of design flexibility for a wide range of operational conditions. Phase 1 research demonstrated the feasibility of the capacitive transducer concepts, as well as its capability to meet and potentially exceed all DoD requirements for transducer performance. Author (GRA)

N85-17350# Technical Univ. of Denmark, Lyngby. Inst. of Electromagnetics.
SPACEBORNE MICROWAVE RADIOMETERS: BACKGROUND AND TECHNOLOGY REQUIREMENTS Final Report
P. Gudmandsen, ed., N. Skou, ed., and B. Wolff, ed. Aug. 1983 176 p refs Original contains color illustrations
(Contract ESTEC-4964/81/NL-MS(SC))
(LD-R-267; ESA-CR(P)-1928) Avail: NTIS HC A09/MF A01

Spaceborne microwave radiometer requirements in atmospheric, oceanographic, and cryospheric applications are discussed. Data processing is considered. Although still in a development phase, microwave radiometry shows examples of operational applications in the fields of atmospheric sounding and sea ice monitoring. The 10-channel Scanning Multichannel Microwave Radiometer on SEASAT and NIMBUS-7 is shown to have a good concept. However, experience suggests that improvements of the techniques, the calibration method, and the data retrieval are desirable. Developments over the past decade concern frequencies below 60 GHz and antenna and receiver techniques as well as development of suitable data retrieval methods. Author (ESA)

N85-17197# Joint Publications Research Service, Arlington, Va.
UK, FRG, FRANCE: R AND D IN SENSORS, RELATED FIELDS
Thomas Jarne, Jan Hellsten, Karl-Gunnar Nilsson, and Dan Andree *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 37-59 Transl. into ENGLISH from Utlandsrappt. (Stockholm), no. 8402, Aug. 1984 p 43-71; 63-71; 78-88; 91-98
(For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

N85-17410# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.
HIERARCHICAL DATA STRUCTURES AND ALGORITHMS FOR DIGITAL STEREOSCOPICAL MENSURATION
Rune Larsson *In its* Papers of the 15th Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Congr. 1984 p 34-42 refs
(For primary document see N85-17406 08-43)
Avail: NTIS HC A05/MF A01

N85-17411# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.
AN EFFICIENT ALGORITHM FOR THE COMPUTATION OF THE INVERSE IN BUNDLE ADJUSTMENT SYSTEMS
Rune Larsson *In its* Papers of the 15th Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Congr. 1984 p 43-53 refs
(For primary document see N85-17406 08-43)
Avail: NTIS HC A05/MF A01

N85-17412# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.
DIGITAL ELEVATION MODEL COMPUTATION USING FAST POISSON SOLUTIONS
Rune Larsson *In its* Papers of the 15th Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Congr. 1984 p 54-64 refs
(For primary document see N85-17406 08-43)
Avail: NTIS HC A05/MF A01

N85-17413# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.
SEQUENTIAL DATA PROCESSING FOR PHOTOGRAMMETRIC ACQUISITION OF DIGITAL ELEVATION MODELS
Anders Oestman *In its* Papers of the 15th Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Congr. 1984 p 65-75 refs (For primary document see N85-17406 08-43)
Avail: NTIS HC A05/MF A01

N85-17889*# Chicago Univ., Ill.
INSTRUMENTATION FOR SUBMILLIMETER POLARIMETRY
Mark Dragovan and Giles Novak *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 335-340 refs Sponsored in part by NSF (For primary document see N85-17848 08-89)
(Grant NsG-2057)
Avail: NTIS HC A17/MF A01 CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.

N85-17351 Illinois Univ., Urbana-Champaign.
THEORETICAL AND EXPERIMENTAL ANALYSES OF LASER ALTIMETERS FOR BAROMETRIC MEASUREMENTS OVER THE

OCEAN Ph.D. Thesis
Bin-Ming Benjamin Tsi 1984 214 p
Avail: Univ. Microfilms Order No. DA8422167

The optical path length from a satellite to the Earth's surface is strongly dependent on the atmospheric pressure along the propagation path. Surface pressure can be determined by measuring the difference between the round-trip propagation times of laser pulses that are transmitted simultaneously at two wavelengths. Although pressure measurements can be made over the ground and water, the application of this technique to pressure measurements over the ocean is considered. The statistical characteristics and the waveforms of the ocean reflected laser pulses are studied. The statistics of time-resolved speckle and its effects on the timing accuracy of the receiver are studied in the general context of laser altimetry. The data obtained from the first airborne two-color laser altimeter experiment are processed and analyzed. The results are used to verify the pressure measurement concept.
Dissert. Abstr.

N85-17352 Department of the Air Force, Washington, D.C.
HALOGEN MASS FLOW RATE DETECTION SYSTEM Patent
S. J. Davis and L. Hanko, inventors (to Air Force) Issued 21 Aug. 1984 8 p
(AD-D011398; US-Patent-4,467,474; US-Patent-Appl-SN-533276; US-Patent-Class-372-89) Avail: US Patent and Trademark Office CSCL 20/5

This abstract discloses an improvement within an oxygen-iodine chemical laser in the form of a mass flow rate detector for rapidly, accurately, and reliably detecting the mass flow rate of iodine into the resonant cavity of the laser. A mass flow rate detector has an absorption cell to which either an inert gas or an iodine-inert gas mixture is passed. An electromagnetic beam of preselected wavelengths in the bound-continuum absorption region is passed through the absorption cell while either the iodine-inert gas mixture or only the inert gas is therein. By measuring the intensity of the beam passing through the absorption cell molecular absorption can be utilized for determining the concentration of the iodine in the iodine-inert gas mixture. From this value the mass flow rate of the iodine passing through the absorption cell and into the resonant cavity of the laser is determined. GRA

N85-17353*# Old Dominion Univ., Norfolk, Va. Dept. of Physics.
NASA THREE-LASER AIRBORNE DIFFERENTIAL ABSORPTION LIDAR SYSTEM ELECTRONICS Final Report, 15 Dec. 1979 - 31 Dec. 1984
Robert J. Allen and Gary D. Copeland Dec. 1984 85 p refs
(Contract NCC1-32)
(NASA-CR-174293; NAS 1.26:174293; PTR-84-3) Avail: NTIS HC A05/MF A01 CSCL 20E

The system control and signal conditioning electronics of the NASA three laser airborne differential absorption lidar (DIAL) system are described. The multipurpose DIAL system was developed for the remote measurement of gas and aerosol profiles in the troposphere and lower stratosphere. A brief description and photographs of the majority of electronics units developed under this contract are presented. The precision control system; which includes a master control unit, three combined NASA laser control interface/quantel control units, and three noise pulse discriminator/pockels cell pulser units; is described in detail. The need and design considerations for precision timing and control are discussed. Calibration procedures are included. R.S.F.

N85-17354# Mathematical Sciences Northwest, Inc., Bellevue, Wash.
SPARK COLUMN PLASMA DYNAMICS MODEL (A FIRST PRINCIPLES MODEL FOR LASER TRIGGERED SPART GAPS) Final Report, 1 Jun. 1983 - 31 Aug. 1984
M. J. Kushner and R. D. Milroy Sep. 1984 93 p
(Contract N00014-83-C-0417; NR Proj. 099-504)
(AD-A147954; MSNW-C.11.253.01) Avail: NTIS HC A05/MF A01 CSCL 12/1

In a laser triggered spark gap (or spark column) breakdown is initiated by a laser which creates a narrow preionized column between the electrodes. This small plasma column expands to an arc with a diameter of 0.5-1.0 mm on a time scale of 100 ns, and is capable of carrying a current in excess of 10 kA. During the expansion phase, the resistance of the plasma column decreases from many kilo-ohms to as little as a few tenths of an ohm. For many applications, the duration of the current pulse through the spark gap is only 100-200 ns and therefore is commensurate with the time required for the plasma column to expand. Therefore during the time of interest, the spark column changes from being a dominant resistive loss to being a lossless circuit element in comparison to the load. In order to optimize the performance and minimize the losses, of laser triggered spark gaps operating under these conditions, it is desirable to have a detailed understanding of the physics of the expansion phase of the spark. This report summarizes the first phase of development of a model to achieve that goal. We discuss a model which, from first principles, describes the growth of the arc in a laser triggered spark gap in a gas mixture of a noble gas and a diatomic molecules. GRA

N85-17355# Pennsylvania State Univ., University Park. Dept. of Materials Science and Engineering.
IN-SITU FORMATION OF A GRAIN BOUNDARY IN FIELD ION MICROSCOPY USING A LASER
H. W. Pickering, T. Sakurai (Tokyo Univ.), and A. Jimbo (Tokyo Univ.) Jun. 1984 13 p
(Contract N00014-81-K-0025)
(AD-A148225) Avail: NTIS HC A02/MF A01 CSCL 20/5

Successful formation and real-time observation is reported of a grain boundary within a view of a FI image using laser beam irradiation in the presence of a high electric field. Formation of the grain boundary in a FI tip appears to be by solid-phase recrystallization due to moderate local heating and extremely high mechanical stresses caused by the electric field and laser irradiation. GRA

N85-17356# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
TWO-PHOTON COHERENT STATE LIGHT - ITS GENERATION AND POTENTIAL APPLICATIONS Final Report, 1 Aug. 1981 - 31 May 1984
Jeffrey H. Shapiro 31 May 1984 99 p
(Contract N00014-81-K-0662; ARPA Order 4258)
(AD-A148245) Avail: NTIS HC A05/MF A01 CSCL 20/5

Recent work has highlighted the potential applications of two-photon coherent states (TCS), also known as squeezed states, in optical communications and precision measurements. This research program was aimed at generating TCS light via degenerate four-wave mixing (DFWM), and verifying the non-classical nature of TCS light via photon-counting measurements. The preceding experimental work was supported by analytical studies of DFWM TCS generation, and quantum photodetection. In addition, analyses were performed of key proposed TCS applications in optical communications and phase-sensing interferometry. Although the experimental effort did not yield any TCS observations, it did succeed in providing the firt quantum-noise limited measurements obtained from DFWM. Moreover, the associated theoretical effort clarified pump quantum noise, probe-conjugate loss, and backward vs forward DFWM issues in TCS generation. Furthermore, the applications research developed simultaneous amplitude and phase uncertainty relations for optical heterodyne detection, and showed explicitly how to use TCS to surpass the so-called standard quantum limit (SQL) on position sensing in a gravity-wave detecting interferometer. Author (GRA)

N85-17357# Toronto Univ. (Ontario). Dept. of Chemistry.
STUDY IN MOLECULAR LASERS Final Report, 1 Nov. 1980 - 30 Apr. 1984
George Burns, H. D. Kutz, L. K. Cohen, and T. C. Billard Oct. 1984 5 p
(Grant AF-AFOSR-0028-81; AF Proj. 2303)
(AD-A148246; AFOSR-84-1038TR) Avail: NTIS HC A02/MF A01 CSCL 20/5

A sensitive LIF system was constructed, using a Nd:YAG plus dye laser. The signal was accumulated and analyzed by employing a Tektronix R7912 transient Digitizer and a PDP-11 minicomputer. Reactivity of HF (v=5) was studied. Using the same equipment, a time-delayed photoemission from a trialkali photosensitive semiconductor was observed and results are now being examined. Using 3-D trajectory calculations a new computational observable, the relative nonequilibrium distributicn (RNED) function at the steady state was determined for the Br + Ar reaction at 3500K. It is characterized by one adjustable parameter equal to 12, while the transition state theory prescribes that it should be infinitely large. RNED will be used to test and refine modern theories of reaction kinetics. Author (GRA)

N85-17358# New Mexico Univ., Albuquerque. Inst. for Modern Optics.
INVESTIGATIONS OF VACUUM ULTRAVIOLET AND SOFT X-RAY LASERS Final Report, 15 May 1983 - 14 Aug. 1984
A. Elci and M. O. Scully Aug. 1984 106 p
(Grant AF-AFOSR-0128-81)
(AD-A148277; AFOSR-84-0993TR) Avail: NTIS HC A06/MF A01 CSCL 20/5

We present the results of our investigations concerning use of surface scattered ions for X-ray lasers, constraints over the operation of free electron laser in the X-ray regime, and effects of intense laser fields on nuclear transitions. Author (GRA)

N85-17359# Letterman Army Inst. of Research, San Francisco, Calif.
POSITION EFFECTS OF LASER PROTECTIVE MATERIALS ON SIMULATOR TRACKING PERFORMANCE Interim Report, period ending Jul. 1984
P. R. Best, R. R. Levine, D. A. Stamper, and J. W. Molchany Oct. 1984 9 p
(DA Proj. 3E1-62777-A-878)
(AD-A148297; LAIR-85-51) Avail: NTIS HC A02/MF A01 CSCL 17/8

A study was conducted to determine if filter location has a differential effect on tracking performance in the BLASER simulator. Eight male volunteers viewed a scale model tank target through BLASER's unity optical sight while attempting to keep the crosshairs fixed on the moving target. Five laser protective filters were used in each of two positions at the objective or the ocular for a total of 10 filter-position combinations. Volunteers had 5 trials under each condition. Variability in tracking performance was assessed using the horizontal SD error following each trial. GRA

N85-17182# Joint Publications Research Service, Arlington, Va.
CONSTRUCTION, TESTING OF 1-MW NITROGEN LASER
R. Weidauer, A. Glismann, R. Konig, and H. Falk *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 40-41 refs Transl. into ENGLISH from Feingeratetech. (East Berlin), v. 33, no. 5, 1984 p 204-206 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N85-17360 Central Electricity Generating Board, London (England). Translations Section.
ELECTRODES FOR REPAIRING POWER ENGINEERING EQUIPMENT MADE FROM CREEP RESISTING STEEL
Yu. N. Gotalskii and V. V. Snisar 1985 11 p refs Transl. into ENGLISH from Prom. Energ. (USSR), v. 5, 1970 p 11-13
(BLL-CE-Trans-8064-(9022.09)) Avail: British Library Lending Div., Boston Spa, England

From experience gained in welding hardening steels the use of filler materials ensuring the formation of an austenitic structure in the weld metal enables cracks to be prevented without resorting to pre-heating and post-weld heat treatment. However, until recently such a technique was not used for welding power engineering equipment because when it was later operated under high temperature conditions (above 350 to 400 C) a characteristic structure inhomogeneity forms in the fusion zone between the austenitic and non-austenitic metal. In many cases this inhomogeneity changes the mechanical properties of the welded metal to such an extent that premature failure of the weld joint occurs. In order to prevent changes in the structure of metals being welded, the austenitic metal fused with the non-austenitic must contain a high percentage of nickel. The higher the operating temperature, the higher must be the nickel content. B.G.

N85-17361 Texas A&M Univ., College Station.
EIGENVALUES OF ROTATING MACHINERY Ph.D. Thesis
Brian Timothy Murphy 1984 230 p
Avail: Univ. Microfilms Order No. DA8419858

The current industry standard for linear eigenanalysis for vibration of rotating machinery is the transfer matrix method. This is true for both lateral and torsional vibration. Lateral vibration computer codes based on this method are subject to a variety of convergence problems including computing eigenvalues in random order, incomplete convergence on some, missing some altogether and a poor capability to compute many roots to try to ensure that none of importance are missed. A method of calculation is presented which overcomes these problems. A technique is derived by which transfer matrices are used to compute the coefficients of the system's characteristic polynomial. The eigenvalues are the roots of this polynomial. While overcoming convergence problems, the method also entails a tremendous increase in execution speed, making it well suited for small computers. The speed advantage is partly brought on by a new technique of condensation. This technique, also described here, is optimized automatically and easy to invoke. Dissert. Abstr.

N85-17362*# Spectra Research Systems, Inc., Huntsville, Ala. Systems Technology Div.
ASSESSMENT OF THE OPERATING CHARACTERISTICS OF THE SSME LOX TURBOPUMP PUMP-END BEARING Final Report, 9 Nov. - 21 Dec. 1984
Linda S. New and Bruce K. Tiller Dec. 1984 29 p refs Sponsored by NASA
(NASA-CR-171287; NAS 1.26:171287; SRS/STD-TR85-009) Avail: NTIS HC A03/MF A01 CSCL 13I

A bearing/shaft model of the SSME LOX turbopump was developed using the SHABERTH bearing/shaft math modeling computer code. A previously developed bearing/shaft thermal model of the SSME LOX turbopump turbine and bearing was used in conjunction with SHABERTH to evaluate the thermomechanical operating characteristics of the LOX turbopump end bearings. Results show that for the two unmounted diametrical clearances evaluated (4.0 mils and 6.3 mils), the inboard pump end bearing supports about 81% of the isolator load for the small clearance and 77% of the isolator load for the larger clearance. Bearing clearance changes due to thermal effects were 40% for the 4.0 mil diametrical clearance case and 19% for the 6.3 mil clearance case evaluated. The thermal analysis included evaluation of bearing temperatures for a subcooled case and a saturated case. Results indicate that no drastic temperature change occurred between the two cases. Since the rolling element and race surfaces of the subcooled case were at temperatures sufficiently high enough to be vapor blanketed, exceeding saturation temperature at the bearing inlet did not increase surface temperatures greatly. R.S.F.

N85-17363*# National Aeronautics and Space Administration, Washington, D. C.
TURBO FLUID MACHINERY AND DIFFUSERS
Teruo Sakurai Sep. 1984 220 p Transl. into ENGLISH of the book "Kikkan Kogyo Shinbunsha" Japan, 30 Sep. 1983 187 p Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77467; NAS 1.15:77467) Avail: NTIS

HC A10/MF A01 CSCL 13I

The general theory behind turbo devices and diffusers is explained. Problems and the state of research on basic equations of flow and experimental and measuring methods are discussed. Conventional centrifugation-type compressor and fan diffusers are considered in detail. R.S.F.

N85-17364*# TRW Space Technology Labs., Redondo Beach, Calif. Power Electronics Hardware Lab.

AUTOMATED ASSEMBLY OF GALLIUM ARSENIDE AND 50-MICRON THICK SILICON SOLAR CELL MODULES Final Test Report

H. G. Mesch Dec. 1984 23 p

(Contract NAS7-918)

(NASA-CR-174331; NAS 1.26:174331) Avail: NTIS HC A02/MF A01 CSCL 13I

The TRW automated solar array assembly equipment was used for the module assembly of 300 GaAs solar cells and 300 50 micron thick silicon solar cells (2 x 4 cm in size). These cells were interconnected with silver plated Invar tabs by means of welding. The GaAs cells were bonded to Kapton graphite aluminum honeycomb graphite substrates and the thin silicon cells were bonded to 0.002 inch thick single layer Kapton substrates. The GaAs solar cell module assembly resulted in a yield of 86% and the thin cell assembly produced a yield of 46% due to intermittent sticking of weld electrodes during the front cell contact welding operation. (Previously assembled thin cell solar modules produced an overall assembly yield of greater than 80%). Author

N85-17365# Michigan Univ., Ann Arbor. Robot Systems Div.

COORDINATED RESEARCH IN ROBOTICS AND INTEGRATED MANUFACTURING Annual Report, 1 Aug. 1983 - 31 Jul. 1984

D. E. Atkins and R. A. Volz 30 Oct. 1984 138 p

(Contract F49620-82-C-0089)

(AD-A148204; RSD-TR-12-84; AFOSR-84-1016TR) Avail: NTIS HC A07/MF A01 CSCL 13/8

The research procured under this contract is oriented toward the understanding and development of the flexible robot based manufacturing cells or islands which will increasingly become basic blocks for the building of modern parts production and assembly facilities. Present work spans a hierarchy of sub-systems oriented toward the development and integration of high performance manipulators into flexible manufacturing cells. GRA

N85-17366# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mechanical Engineering.

STRUCTURE OF SOLIDS SURFACES IN WEAR SITUATIONS Final Report

J. L. Lauer 17 Oct. 1984 120 p

(Grant AF-AFOSR-0005-81)

(AD-A148480; AFOSR-84-0970TR) Avail: NTIS HC A06/MF A01 CSCL 11/8

Identification and understanding of the surface phenomena involved in lubrication and wear are necessary if failures are to be avoided or at least mitigated. Failure of lubrication and high wear rates can be very costly to both civilian and military machinery. While many new methods of surface analysis have been developed in recent years, their requirements of ultrahigh vacuum and of electron bombardment make these methods destructive. Furthermore they mostly furnish only element analysis and then their spatial resolution is not high. A realistic system was selected for these wear studies; an operating bearing contact consisting of a loaded M-50 bearing steel ball-on-plate mock-bearing and lubricants simulating MIL 23699 and its additives, i.e., a most common heavily loading bearing system. Significant changes were found: (1) in the changes of the surface profile within the wear track over the course of bearing operation for different lubricants, (2) in the rate of oxidation of the steel bearing surface within and without the wear track, (3) in the rate of the change of optical profile within and without the wear track after a brief exposure to dilute hydrochloric acid, and (4) in the friction for different lubricants. Common surface additives in lubricants, such as tricresylphosphate (antiwear) and benzotriazole (anticorrosion), produced larger profile changes then other common lube additives. Invariably these changes could be associated with the more rapid formation of surface oxides within than without the wear track. GRA

N85-17367# Department of the Navy, Washington, D. C.

IN-SITU ANNULAR FACE GRINDER Patent Application

B. D. Sears, J. F. Wilger, J. R. Cazinha, D. J. Reames, and G. G. Holland, inventors (to Navy) Filed 9 Apr. 1984 13 p

(AD-D011422; US-Patent-Appl-SN-597966) Avail: NTIS HC A02/MF A01 CSCL 13/9

A machine is provided for grinding the top surface of an annular body. The machine includes a block which is receivable within the annulus of the body. The top of the block has a central hole. A plurality of rods slidably extend transversely through the block with a first end of each rod extendable into the hole and a second end of each rod extendable from a side of the block opposite the inside curved surface of the annular body. A plurality of arcuate pads are provided wherein each pad has an arc which conforms to the curve of the inside of the annular body. Each pad is connected to a respective second end of each rod. A bolt is threaded into the central hole of the block, the bolt having a bottom tapered portion for engaging the first ends of the rods so that when the bolt is threaded into the block the rods will be forced outwardly to engage the arcuate pads with the inside curved surface of the annular body. A turntable is slidably mounted on the top of the block. A grinding device is mounted on the turntable and has a downwardly facing grinding surface for engaging the top surface of the annular body. A device is provided for moving the grinding surface toward and away from the top surface of the body. Author (GRA)

N85-17368# Department of the Air Force, Washington, D.C.

MULTIPLE RATE SHOCK ISOLATOR DAMPING VALVE Patent Application

R. M. Foster, inventor (to Air Force) Filed 19 Sep. 1984 21 p

(AD-D011429; US-Patent-Appl-SN-651961) Avail: NTIS HC A02/MF A01 CSCL 13/7

An improved direct acting, hydraulic shock isolator system including a novel damping valve exhibiting variable damping characteristics depending on degree of valve extension is described which comprises a hydraulic cylinder defining a closed reservoir at each end and containing a hydraulic fluid, a piston interconnecting the structural members between which relative movement is to be damped and disposed for slidable movement within the cylinder, the piston having first and second axially spaced portions sized for sealing engagement with the inner surface of the cylinder and connected by an intermediate third axial portion of reduced outer diametric size, the first and second portions each including a predetermined number of axial holes of predetermined size for displacement of fluid from one side of the piston to the other in response to movement of the piston through the fluid, and an annular member of outer diameter smaller than the first and second portions and slidably disposed on the third piston portion and restrained for axial movement between limits defined by the confronting surfaces of the first and second portions, the annular member including a pair of confronting peripheral flanges, each including axial holes smaller in size and corresponding in number of the axial holes in the first and second portions and disposed in substantially registering alignment therewith. GRA

N85-17369# Department of the Air Force, Washington, D.C.

FLOW MEASUREMENT DEVICE Patent Application

T. C. Chandler, inventor (to Air Force) Filed 17 Oct. 1984 18 p

(AD-D011432; US-Patent-Appl-SN-661834) Avail: NTIS HC A02/MF A01 CSCL 13/7

A device is described for measuring fuel flow to a power plant such as a turbo fan engine with a very high degree of accuracy, for example, + or - 0.5%. A tubular flow loop having quick disconnect fittings for detachably connecting the loop between the aircraft fuel system outlet and the engine fuel inlet is disclosed. Two specially calibrated mass flow transmitters are arranged in series, each preceded by a straight section of piping having a preferred given length to diameter ratio. Preceding each

of the two straight pipe sections is a honeycomb flow straightener and three in-series perforated plates for removing any effects of upstream flow characteristics from the transmitters. GRA

N85-17370# Department of the Air Force, Washington, D.C.
INERT ATMOSPHERE TRANSFER VESSEL Patent Application
J. T. Maloy, inventor (to Air Force) Filed 2 Oct. 1984 12 p
(AD-D011433; US-Patent-Appl-SN-657100) Avail: NTIS HC A02/MF A01 CSCL 13/4

A novel hermetically sealed, protective atmosphere transfer vessel is described which comprises a container defining an interior cavity and opening thereof for receiving a sample to be protected during transfer, an annular lip surrounding the opening for receiving a flexible puncturable membrane stretched across the opening for hermetically sealing the container, and a wire puncture bridge attached at one to the container and having at the other end a point postioned near the membrane whereby pressure internal of the container expands the membrane against the point to puncture and tear away the membrane for exposure of the sample. An alternative embodiment includes a lid for the container including an axial exhaust hole therethrough and a ball valve for sealing the exhaust hole under the influence of external pressure on the lid. Author (GRA)

N85-17371# Hanford Atomic Products Operation, Richland, Wash.
CONCEPTUAL DESIGN REPORT FOR A REMOTELY OPERATED CASK HANDLING SYSTEM, REVISION 1
J. A. Yount and J. D. Berger Sep. 1984 198 p refs
(Contract DE-AC06-76FF-02170)
(DE85-000348; HEDL-7376-Rev-1; TTC-0449-Rev-1) Avail: NTIS HC A09/MF A01

Advances in remote handling utilizing commercial robotics are conceptually applied to lowering operator cumulative radiation exposure and increasing throughput during cask handling operations in nuclear shipping and receiving facilities. Functional criteria for facility equipment, equipment technical outline specifications, and interface control drawings to assist architecture engineers in the application of remote handling to waste shipping and receiving facilities. Some of the equipment used in proof of principle testing is shown. DOE

N85-17372# Preston Polytechnic (England). School of Mechanical and Production Engineering.
THE ANALYSIS OF KINEMATIC RESTRAINT AND FREEDOM USING POINT CONTACTS
D. R. Kerr and D. J. Sanger (Salford Univ.) Dec. 1982 85 p refs
(RR-154/03/75/02) Avail: NTIS HC A05/MF A01

A therory to describe the relative instantaneous kinematic restraint of two rigid bodies in multiple point contact is outlined. The theory is based on geometrical properties of the contacts, and is developed using the linear algebra of vectors, screws, and their scalar and inner products respectively. The extent and nature of the state of restraint, and of freedom, are evaluated by reference to the rank, and to the existence of positive solutions of systems of homogeneous equations formed by these products. Residual freedoms are expressed in vector form, by extending the results so obtained with the application of simple vector methods. It is also possible to specify further contacts by which the state of restraint can be enhanced, or completed. Cases in which there are special geometrical relationships between contacts are shown to be catered for within the theory. Author (ESA)

N85-17373# Preston Polytechnic (England). School of Mechanical and Production Engineering.
THE SYNTHESIS OF KINEMATIC RESTRAINT AND FREEDOM USING POINT CONTACTS
D. R. Kerr and D. J. Sanger (Salford Univ.) Jun. 1983 66 p refs
(RR-154/03/75/03) Avail: NTIS HC A04/MF A01

Ways of choosing point contacts by which a body may be supported, to allow specific kinematic freedom or restraint are developed. Methods of arriving at suitable contacts for the formation of a basis of contacts, and for the generation of an algebraically-closing contact are given. Examples of the complete restraint of a cube; of the synthesis of a helical pair; and of the sythesis of a cylindric pair are outlined. In each case, the state of kinematic restraint is presented. Author (ESA)

N85-17374# National Centre of Tribology, Risley (England).
THE WEAR OF SMALL POLYACETAL AND POLYMIDE GEARS IN VACUUM
K. T. Stevens Paris ESA 1984 19 p refs
(Contract ESA-4099/79)
(ESA-ESTL-058; ESA-CR(P)-1930) Avail: NTIS HC A02/MF A01

Wear tests on instrument-type gears made from three types of plastic operating against stainless steel gears in vacuum are described. Carbon fiber reinforced polyacetal gears and MoS2-filled polyimide gears perform well, the polyimide giving the lower wear rate of the two, mainly as a consequence of less running-in wear. A porous polyimide gear impregnated with a space-approved lubricant gives wear performance inferior to a similar, unlubricated gear. Tooth wear (depth/tooth encounter) is shown to be proportional to square root of load and to be unaffected by speed. Wear results obtained, for only one case, show an encouraging agreement with theoretical predictions based on an equation which relates tooth wear rate with the independently measured property of volume lost per unit sliding distance. Author (ESA)

N85-17375# KHD Luftfahrttechnik G.m.b.H., Oberursel (West Germany). Werkstofftechnik AT-W.
APPLICATION OF DIFFUSION WELDING OF NICKEL BASED METALS AND APPLICATION OF ELECTRON BEAM WELDING OF HOT ISOSTATICALLY PRESSED NICKEL BASED POWDERED METALS Final Report
K. Schreck and H. Klatt 31 Dec. 1983 60 p refs In GERMAN; ENGLISH summary
(BMFT-01ZB1009-D-15/16)
Avail: NTIS HC A04/MF A01

The diffusion welding of the nickel based cast alloy MAR M 247 and the electron beam welding of hot isostatically pressed powdered metal nickel based alloy AP1 were investigated. The alloy MAR M 247, developed for integrally cast turbine wheels, is characterized by high strength values and excellent elongation values. It is shown that the material has only a weak tendency for grain coalescence in the bonding area at diffusion welding or brazing, and that it fails to form homogeneous bondings in the structure. Remarkable results are obtained by varying surface roughness and preforming pressure at temperatures below the actual diffusion welding temperature. During electron beam welding of AP1 porosity and fissures in the weld itself and in the heat affected adjacent zones are avoided by the use of a function generator which makes the electron beam oscillate. Static strength tests on electron beam welded specimens show satisfactory mechanical strength properties. Author (ESA)

N85-17376# Cranfield Inst. of Tech., Bedford (England). School of Industrial Science.
EFFECT OF IRON ON THE PERFORMANCE OF IN 625 WELD DEPOSITS Final Report
J. P. Chubb and J. Billingham Mar. 1984 28 p refs
(BR91456) Avail: NTIS HC A03/MF A01

The effect of iron dilution on the properties of single layer clad deposits of IN 625 on steel was studied. By varying the welding procedure, the level of iron dilution was controlled and the effect on subsequent coating performance determined. Corrosion behavior of the claddings was compared to wrought IN 625 and to other materials specified for their resistance to sea water corrosion attack. Results show that single layer cladding of IN 625 by the pulsed MIG technique is a viable process for sea water service operations. Even at iron dilutions up to 20%, the corrosion performance and mechanical properties remain comparable to those of the wrought alloy. Author (ESA)

N85-17169# Joint Publications Research Service, Arlington, Va.
CONTROL SYSTEMS FOR ROBOTIC PRODUCTION LINES
L. Y. Lerner and V. R. Lifman *In its* USSR Rept.: Machine Tools

and Metalworking Equipment (JPRS-UMM-84-021) 20 Dec. 1984 p 17-23 Transl. into ENGLISH from Mekhan. i Avtomatiz. Proizv. (Moscow), no. 5, May 1984 p 4-5 (For primary document see N85-17168 08-31)
Copyright. Avail: NTIS HC A04

N85-17174# Joint Publications Research Service, Arlington, Va.
DESIGN FEATURES, APPLICATIONS OF NEW ROBOTS
V. I. Kharkov *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-85-001) 3 Jan. 1985 p 31-44 Transl. into ENGLISH from Mekhan. i Avtomatizatsiya Proizv. (Moscow), no. 5, May 1984 p 41-46 (For primary document see N85-17172 08-31)
Copyright. Avail: NTIS HC A03

N85-17175# Joint Publications Research Service, Arlington, Va.
NEW APPLICATIONS FOR ROBOT LOADERS, UNLOADERS
A. Mishin *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-85-001) 3 Jan. 1985 p 45-46 Transl. into ENGLISH from Ekon. Gazeta (Moscow), no. 33, Aug. 1984 p 24 (For primary document see N85-17172 08-31)
Avail: NTIS HC A03

N85-17177# Joint Publications Research Service, Arlington, Va.
MAN-MACHINE COMMUNICATION RESEARCH FOR ROBOTICS REPORTED
Karl-Heinz Tempelhof and Rudolf Meyer *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 1-3 Transl. into ENGLISH from Volksstimme (Magdeburg), 18 May 1984 p 4 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

N85-17178# Joint Publications Research Service, Arlington, Va.
ROBOTICS APPLICATION IN CONSTRUCTION INDUSTRY ASSESSED
Hans Erdmann *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 4-5 Transl. into ENGLISH from Berliner Zeitung (East Berlin), 1 Aug. 1984 p 3 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

N85-17184# Joint Publications Research Service, Arlington, Va.
RESEARCHERS ON THIRD GENERATION ROBOTICS DEVELOPMENT
Martin Schroeter *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) 28 Dec. 1984 p 1-3 Transl. into ENGLISH from Leipziger Volkszeitung (Leipzig), 19 - 20 May 1984 p 9 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

N85-17193# Joint Publications Research Service, Arlington, Va.
FRG CERAMIC ENGINE COMPONENTS (PET) Abstract Only
In its West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 6 Transl. into ENGLISH from Frankfurter Zeitung/Blick Durch die Wirtsch. (Frankfurt/Main), 1 Nov. 1984 p 7 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

N85-17195# Joint Publications Research Service, Arlington, Va.
EUROPEANS ACTIVE IN MAGNETIC BEARING INDUSTRY
In its West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 19-21 Transl. into ENGLISH from Mondo Econ. (Milan), 25 Oct. 1984 p 69 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

N85-17201# Joint Publications Research Service, Arlington, Va.
ROBOTICS RESEARCH, INTEGRATION OVERVIEW PRESENTED. APPLICATION OBJECTIVES CITED
G. K. *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-043) 3 Dec. 1984 p 11-15 Transl. into ENGLISH from Volksarmee (East Berlin), no. 5, 1984 p 11 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N85-17377# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A STUDY OF AIR FORCE QUALITY CIRCLE PROGRAM EFFECTIVENESS AS VIEWED THROUGH FACILITATOR'S PERCEPTIONS M.S. Thesis
D. R. Murvin and N. L. Singer Sep. 1984 97 p
(AD-A147633; AFIT/GLM/LSM/84S-49) Avail: NTIS HC A05/MF A01 CSCL 05/10

Since August 1981, the Air Force Inst. of Technology, School of Systems and Logistics, Dept. of Organizational Behavior and Science (AFIT/LSB) has been training both Air Force civilian and military personnel to function as Air Force Quality Circle facilitators. This thesis project was an exploratory effort to determine the effectiveness of Air Force Quality Circle programs as perceived by the facilitators, and to identify characteristics present in effective programs. Literature was reviewed which discussed the history of Quality Circles, application and results of Quality Circle implementation, and elements instrumental in successful Quality Circle programs. Air Force military personnel trained by AFIT/LSB as Quality Circle facilitators were surveyed to determine their Quality Circle programs perceived effectiveness, and to determine characteristics of those programs contributing to their success. Only the use of a written implementation plan surfaced as significantly related to the effectiveness of those programs. This factor, as well as other characteristics examined and their findings, are presented, and recommendations for future research provided. GRA

N85-17378# Materials Research Labs., Ascot Vale (Australia).
AGE LIFE PREDICTION OF NYLON 66 PARACHUTE MATERIALS. PART 1: MECHANICAL PROPERTIES
G. T. Egglestone and G. A. George May 1984 31 p
(AD-A147698; MRL-R-930-Pt-1) Avail: NTIS HC A03/MF A01 CSCL 11/5

Losses in mechanical properties of both suspension lines and parachute canopy material from used PX-1 series parachutes are reported. The loss in canopy material strength was found mainly to result from the storage environment while those for suspension lines resulted from a combination of storage and usage. Rates of strength losses for canopy material in storage were predicted using accelerated aging techniques. These rates were determined for both the PX and T-10 series of parachutes. The calculated rates were found to differ for each parachute type and the current T-10 parachute material was predicted to loose less strength than the earlier PX type at the same storage temperature. Daylight exposure studies on the same materials showed the reverse trend with the T-10 series being more easily degraded than the PX series. Tensile strength measurements done on suspension lines from used parachutes gave strength losses larger than those expected from storage temperature oxidation. This increased loss was considered to result from shearing of nylon filaments by accumulated abrasive material. Acoustic emission during line fracture supported this type of failure. Low temperatures had a negligible effect on suspension lines. The energy absorbing characteristics of the lines remained reasonably constant over the temperature range of -40 deg C to 22 deg C. GRA

N85-17379# NDT Technologies, Inc., South Windsor, Conn.
ELECTROMAGNETIC INSPECTION OF WIRE ROPES USING SENSOR ARRAYS Quarterly Progress Report, 16 Jun. - 15 Sep. 1984
H. R. Weischedel 5 Nov. 1984 4 p
(Contract N00014-83-C-0484)
(AD-A148317; AD-E700012) Avail: NTIS HC A02/MF A01 CSCL 14/2

Contents: Instrument for the Inspection of Wire Rope End

Sections; Instrument Calibration; Remagnetization Effect; Mechanical Position Transducer; Strand Counter; Data Acquisition System; Integrator Circuit; and Annual Report. GRA

N85-17380# Stanford Univ., Calif. Lab. of Physics.
RESEARCH ON NONDESTRUCTIVE TESTING Final Report, 11 Sep. 1979 - 31 Mar. 1984
Gordon S. Kino, D. K. Peterson, D. Corl, S. D. Bennett, R. Baer, A. Selfridge, B. T. Khuri-Yakub, D. M. Barnett, and C. K. Wong Mar. 1984 95 p
(Contract F49620-79-C-0217; AF Proj. 2306)
(AD-A148375; SU-GL-3744; AFOSR-84-1065TR) Avail: NTIS HC A05/MF A01 CSCL 14/2

A program of research on nondestructive testing is described. A new type of synthetic-aperture real-time electronically-scanned imaging system was developed for the observation and sizing of cracks in metal structures. A new type of acoustic microscope was developed for accurately measuring the depth and width of surface features, and for quantitative measurements of materials properties. A new theory and experimental techniques were developed for measuring attenuation and phase velocity, and for the prediction of attenuation and phase velocity in granular materials; this makes it possible to measure the microstructure. For the first time, acoustoelastic measurements of stress in plastically deformed regions were carried out and correlated with theory. New theoretical techniques were developed for prediction of the stress intensity factors and energy associated with cracks and inclusions. Author (GRA)

N85-16736# Ferranti Ltd., Edinburgh (Scotland). Product Support Dept.
A PRACTICAL EXAMPLE OF REDUCING LIFE CYCLE COSTS AND INCREASED AVAILABILITY
R. P. F. Lauder *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 11 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N85-17381 United Kingdom Atomic Energy Authority, Risley (England).
FINITE ELEMENT CALCULATION FOR A Y-JOINT AND COMPARISON OF RESULTS WITH STRAIN MEASUREMENTS
E. Hermes and H. J. Hansen 5 Jul. 1984 20 p Transl. into ENGLISH of conf. paper "Finite Elemente-Berechnungen fuer einer Y-Knoten und Vergleich der Ergebnisse mit Dehnungsmessungen", 1981 Presented at the Steel in Maritime Struct. Conf., Paris, 5-8 Oct. 1981
(BLL-Risley-Tr-4526-(9091.9F)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

To determine the deformability and stress behavior of a Y-joint of given dimensions, the brace is subjected to tensile, compressive, and bending loads. On the basis of an aggregate coarse-meshed idealisation, fine rectilinear structures are employed to examine in greater detail the stress variations in the vicinity of the brace/chord weld. At the same time the effects of the weld configuration are estimated by means of a 2-dimensional calculation. The stress results are compared with the strain measurements on the same Y-joint which was subjected to a static and dynamic load test. On the basis of these calculations, stress concentration factors are determined and compared with known values derived from the literature. Author

N85-17382# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 16, NO. 11 Monthly Report
Judith Nagle-Eshleman, ed. Nov. 1984 108 p refs
(AD-A148466) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Publications on design and testing of shock waves, earthquakes and vibration on large are presented. Topics discussed include the influence of vibration on composite materials, weightlessness, stimulation, structures, solar panel stiffness; and payloads. It is suggested that better techniques to be developed for scale model tests, analytical prediction models, in-orbit testing of structures like solar panels flower on the shuttle, and tabulation of data on damping properties of the new composite materials. For individual titles, see N85-17383 through N85-17384.

N85-17383# National Research Inst., Bankura (India).
ON SEISMIC WAVES **c46**
Sasadhar De *In* Shock and Vibration Information Center The Shock and Vibration Digest, V. 16, No. 11 Nov. 1984 p 3-24 refs (For primary document see N85-17382 08-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 08/11

Various aspects of the propagation of elastic waves on Earth were examined. Mathematical methods, waves due to explosion and oscillation of the Earth, seismic prospecting, seismic risk, ground motion and structures, and mechanisms and prediction of earthquakes are discussed. E.A.K.

N85-17384# Department of Agriculture, Madison, Wis. Forest Products Lab.
SEISMIC PERFORMANCE OF LOW-RISE LIGHT-FRAMED WOOD BUILDINGS **c31**
L. A. Soltis *In* Shock and Vibration Information Center The Shock and Vibration Digest, V. 16, No. 11 Nov. 1984 p 27-32 refs (For primary document see N85-17382 08-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375

The performance of wood structures in earthquakes was presented. Component and building response, and current design philosophy are examined. It is found that wood structures perform adequately when they are symmetric in plan and elevation and have adequate shear walls. Bad performance occurs when there is a lack of or nonsymmetric arrangement of racking walls. E.A.K.

N85-17385 State Univ. of New York, Stony Brook.
NUMERICAL SOLUTION OF ELASTODYNAMIC PROBLEMS IN FRACTURE MECHANICS Ph.D. Thesis
Michael King Ong 1984 107 p
Avail: Univ. Microfilms Order No. DA8422580

Three separate elastodynamic problems in linear elastic fracture mechanics are formulated as mixed boundary-value problems of classical elasticity. Each problem is reduced to a singular integral equation with a Cauchy principal value kernel which is then solved numerically using Gauss-Chebyshev quadrature for some physical quantities of interest. Dissert. Abstr.

N85-17386 Purdue Univ., Lafayette, Ind.
CONTACT BEHAVIOR, IMPACT RESPONSE AND DAMAGE IN GRAPHITE-EPOXY LAMINATES SUBJECTED TO INITIAL STRESSES Ph.D. Thesis
Bhavani Sankar 1984 114 p
Avail: Univ. Microfilms Order No. DA8423421

Analytical methods were developed to study the problem of indentation of a beam by a rigid cylinder. The contact coefficient is found to depend on the transverse Young's modulus. At smaller loads, initial stresses have no significant effect on the contact behavior. Numerical methods were developed to compute the response due to low velocity impact. A higher order, rectangular, plane strain finite element was used to model laminated beams under initial stresses on the impact response of a graphite-epoxy laminated beam. The effects of preload on the impact duration, coefficient of restitution, maximum impact force, and bending and shear stresses were studied. Low velocity impact tests were

conducted to measure the contact force directly during impact. The measured impact response was found to be in good agreement with the finite element computations. Specimens were also impacted with velocities high enough to cause damage. It is found that the tensile initial stresses decrease the threshold velocity for damage. But, the extent of delamination can be reduced by the initial stresses. Dissert. Abstr.

N85-17387 Michigan Univ., Ann Arbor.
ON A GENERAL NONLINEAR THEORY OF PLATES AND SHELLS: FORMULATION AND APPLICATIONS Ph.D. Thesis
Kamal Ahmed Meroueh 1984 178 p
Avail: Univ. Microfilms Order No. DA8422289

A consistent and efficient nonlinear theory for shell type structures undergoing large deformations and rotations as well as large strains is presented. The formulation is valid for a broad class of rate independent constitutive equations. Starting from the governing equations of a three dimensional solid in a full Lagrangian description and adopting only one consistent kinematical approximation, a director type of shell theory is derived in its most general tensorial form employing curvilinear coordinates. Consequently, the effect of transverse and normal strains are incorporated in a natural way in the proposed shell theory. The behavior of plates subjected to finite pure bending, to a uniformly distributed transverse load and to a linearly distributed shear load are analyzed successively by employing both the proposed theory as well as the exact three dimensional formulation. Two classes of constitutive laws are utilized in order to assess the validity of the theory in the nonlinear regime: a hyperelastic model and a hypoelastic model. Dissert. Abstr.

N85-17388 Oklahoma Univ., Oklahoma City.
A STUDY OF CONSTITUTIVE RELATIONS FOR POLYCRYSTALLINE ALUMINUM DURING FINITE DYNAMIC PLASTIC DEFORMATION Ph.D. Thesis
Chiuder Hsiao 1984 86 p
Avail: Univ. Microfilms Order No. DA8423979

An experimental study was made of the plastic wave propagation in fully annealed and as received 1100-F aluminum subjected to axisymmetric constant velocity free flight impact in the range of 200 in/sec (5 m/sec) to 3000 in/sec (75 m/sec). The direct experimental measurements established the applicability of one dimensional strain rate independent finite amplitude wave theory. These dynamic strain profiles were used to determine a dynamic response function to describe the character of plastic wave deformation. The results show that there are distinct differences in the behavior when the strain levels are in between inner and outer yield limits and when strain levels are beyond the outer yield limit. Dissert. Abstr.

N85-17389 Brown Univ., Providence, R. I.
THE RESPONSE OF METALLIC STRUCTURES TO DYNAMIC LOADING Ph.D. Thesis
Juan Manuel Mosquera 1984 159 p
Avail: Univ. Microfilms Order No. DA8422456

The experimental results on the dynamic mechanical response of beams of fiber reinforced materials when these are subjected to transverse loading are described. The response both when elastic deformation and plastic deformation are observed is described, and it is shown that the elastic response corresponds very closely to the theoretical predictions of Sayir whose theory is developed by the methods of asymptotic analysis. The behavior of isotropic structures when they are loaded dynamically by force pulses of arbitrary shape and long duration is also described. The elastic plastic interaction that characterizes the structural response when plastic deformations take place, is more significant for these loading conditions than it is for impulsive loading such as that produced by the detonation of explosive charges. The experimentally observed results of the transverse impact of a portal frame hit at the center of one of its columns is compared with the predictions of finite element calculations and also with the predictions of a simplified elastic plastic technique. Dissert. Abstr.

N85-17390*# National Aeronautics and Space Administration, Washington, D. C.
TENSILE TEST OF PRESSURELESS-SINTERED SILICON NITRIDE AT ELEVATED TEMPERATURE
Katsutoshi Matsusue, Yoshiaki Fujisawa, and Kitao Takahara Jan. 1985 28 p refs Transl. into ENGLISH of "Tohatsu shoketsu chikka keisono kohon hippan shiken" rept. NAL-TR-753, Tokyo, 1983 17 p Original language document previously announced as N84-13611 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original document prepared by National Aerospace Lab., Tokyo
(Contract NASw-4004)
(NASA-TM-77777; NAS 1.15:77777; NAL-TR-753) Avail: NTIS HC A03/MF A01 CSCL 20K

Uniaxial tensile strength tests of pressureless sintered silicon nitride were carried out in air at temperatures ranging from room temperature up to 1600 C. Silicon nitrides containing Y2O3, Al2O3, Al2O3-MgO, or MgO-CeO2 additives were tested. The results show that the composition of the additive used influences the strength characteristics of the silicon nitride. The tensile strength rapidly decreased at temperatures above 1000 C for the materials containing MgO as the additive and above 1000 C for the material with Y2O3. When the temperature increased to as high as 1300 C, the strength decreased to about 10 percent of the room temperature strength in each case. Observations of the fracture origin and of the crack propagation on the fracture surfaces are discussed. Author

N85-17391*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A NUMERICAL METHOD FOR INTERFACE PROBLEMS IN ELASTODYNAMICS
David S. McGhee Dec. 1984 105 p refs
(NASA-TM-86488; NAS 1.15:86488) Avail: NTIS HC A06/MF A01 CSCL 20K

The numerical implementation of a formulation for a class of interface problems in elastodynamics is discussed. This formulation combines the use of the finite element and boundary integral methods to represent the interior and the exteriro regions, respectively. In particular, the response of a semicylindrical alluvial valley in a homogeneous halfspace to incident antiplane SH waves is considered to determine the accuracy and convergence of the numerical procedure. Numerical results are obtained from several combinations of the incidence angle, frequency of excitation, and relative stiffness between the inclusion and the surrounding halfspace. The results tend to confirm the theoretical estimates that the convergence is of the order H(2) for the piecewise linear elements used. It was also observed that the accuracy descreases as the frequency of excitation increases or as the relative stiffness of the inclusion decreases. Author

N85-17392# Computational Mechanics Consultants, Austin, Tex.
COMPUTATIONAL METHODS FOR NONLINEAR DYNAMICS PROBLEMS IN SOLID AND STRUCTURAL MECHANICS Final Report, 1 Feb. - 31 Oct. 1983
John Tinsley Oden 20 Dec. 1983 192 p
(Contract F49620-83-C-0058; AF Proj. 2307)
(AD-A148352; TR-83-08; AFOSR-84-0929TR) Avail: NTIS HC A09/MF A01 CSCL 20/11

Nonclassical Friction Laws: In order to overcome mathematical and numerical difficulties inherent in classical friction laws when applied to contact problems in continuum mechanics and to apply more physically reasonable simulations of dry static contact on metallic surfaces, new nonclassical friction laws were derived and implemented in an analysis of a wide class of contact problems in elastostatics. A complete theory was developed including existence theorems, approximation theorems, error estimates, algorithms, and finite element computer codes. Quasi-Static Friction Problems: New variational principles were derived for numerical simulation cyclic loading of metallic bodies in contact on surfaces on which nonclassical friction laws were assumed to hold. Finite element methods were developed using these formulations and several numerical examples were studied. Plasticity Models of

Friction: Two friction models of friction effects on metallic surfaces subjected to quasi-static load reversals were developed and implemented in finite element analyses. Thorough theoretical analysis of one of these was completed, and one formulation was sufficiently general to take into account large elastoplastic deformations. Dynamic Friction: A general variational principle for elastodynamic contact problems with friction was derived and used to develop new finite element methods for such problems. Error estimates and dynamic stability criteria were investigated. Extensions to problems with velocity-dependent friction coefficients were studied numerically. GRA

N85-17393# Northwestern Univ., Evanston, Ill. Dept. of Materials Science and Engineering.
DETERMINATION OF THE ELASTIC CONSTANTS OF INHOMOGENEOUS MATERIALS WITH X-RAY DIFFRACTION
I. C. Noyan Oct. 1984 28 p
(Contract N00014-80-C-0116)
(AD-A148469; TR-15) Avail: NTIS HC A03/MF A01 CSCL 20/6

Experimental determination of the elastic constants is of fundamental importance in residual stress analysis with X-rays. Such constants are usually termed X-ray elastic constants. In certain materials changes have been observed in these elastic constants as a result of plastic deformation. However, since for some of such cases the d vs. sin psi plots used in the analysis were not linear, as predicted by theory, but oscillatory, the meaning of these variations was not fully understood. In this paper the meaning of X-ray elastic constants obtained from materials with oscillatory d vs. sin psi plots is examined. It is shown that X-ray diffraction analysis is a powerful tool that can be used to determine the effective elastic constants of the material under investigation, even when the material is inhomogeneous. Author (GRA)

N85-17394# Applied Research Associates, South Royaltan, Vt.
RESPONSE OF SATURATED POROUS NONLINEAR MATERIALS TO DYNAMIC LOADINGS Final Report
K. J. Kim and S. E. Blouin 31 May 1984 103 p
(Contract F49620-81-C-0014)
(AD-A148528; AFOSR-84-1102TR) Avail: NTIS HC A06/MF A01 CSCL 08/12

Past theoretical treatments of two phase media are reviewed and incorporated into the two phase dynamic finite element code TPDAP. A study of the response of two phase porous elastic media to dynamic uniaxial loadings is conducted and the influence of loading shape, material properties, and numerical techniques and parameters are evaluated. A series of calculations simulating uniaxial loadings of saturated soils having hysteretic skeletons is conducted. Zones of liquefaction occuring in these calculations are identified and the mechanics of liquefaction and influence of parametric variations on liquefaction are investigated and described. GRA

N85-17395# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Werkstofftechnologie.
CORRELATION OF STABLE CRACK GROWTH WITH THE J-INTEGRAL AND THE CRACK TIP OPENING DISPLACEMENT, EFFECTS OF GEOMETRY, SIZE AND MATERIAL: REPORT ON AN INVESTIGATION OF THE ELASTIC-PLASTIC R-CURVE METHODOLOGY Progress Report
K.-H. Schwalbe and D. Hellmann 1984 84 p refs Sponsored by Deutsche Forschungsgemeinschaft
(GKSS-84/E/37; ISSN-0344-9629) Avail: NTIS HC A05/MF A01

Empirical criteria for the limits up to which the J-integral and the crack tip opening displacement (delta5) measured over a gage length of 5 mm can serve as correlation parameters for stable crack growth were studied. Material, specimen geometry, precrack length, specimen width, and specimen thickness were systematically varied. Under plane stress conditions, both J and delta5 correlate crack growth much better on CCT specimens than on CT or SENB specimens. On CT and SENB specimens delta5 correlates 5 times as much crack growth as J. In plane stress, the CCT geometry has a much bigger measurement capacity than in plane strain, the actual value for the JR-curve depending on the strain hardening properties of the material. Author (ESA)

N85-17396# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Werkstofftechnologie.
A SIMPLE ENGINEERING TREATMENT OF CENTER CRACKED TENSION PANELS IN THE REGIME OF NONLINEAR FRACTURE MECHANICS UNDER PLANE STRESS CONDITIONS
K.-H. Schwalbe 1984 51 p refs
(GKSS-84/E/38; ISSN-0344-9629) Avail: NTIS HC A04/MF A01

An engineering treatment model (ETM) to assess the mechanical behavior of the center cracked tension geometry in plane stress was developed. Formalisms for the prediction of the crack tip opening displacement and the J-integral which can serve for driving force calculations were derived. Failure conditions predicted by the ETM correlate well with experimental values. Author (ESA)

N85-17397# Oxford Univ. (England). Dept. of Engineering Science.
A DISCUSSION OF PROBLEMS ENCOUNTERED IN THE DYNAMIC FRACTURE TOUGHNESS TESTING OF MATERIALS
R. S. J. Corran, F. GarciaBenitez, J. Harding, and C. Ruiz 1984 10 p refs Presented at 3rd Oxford Conf. on Mech. Properties of Mater. at High Rates of Strain, Oxford, 9-12 Apr. 1984 Submitted for publication Sponsored by UK Science and Engineering Research Council
(OUEL-1524/84) Avail: NTIS HC A02/MF A01

A technique for semi-routine determination of dynamic fracture toughness in which the effects of friction are taken into account and equilibrium conditions in the specimen are ensured was developed. The response of compact tension specimens to impact wedge loading at the pins was monitored. Results show a significant variation in the coefficient of friction during the dynamic loading process and an increased time required for the establishment of quasi-static equilibrium in precracked or sharply notched specimens compared with those containing blunt or rounded notches. It is not possible to use measurements obtained from the loading bars alone and a close monitoring of the specimen is necessary. Author (ESA)

N85-17398# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
ENGINEERING PROPERTY COMPARISONS OF PM AND IM ALUMINUM ALLOY FORGINGS
R. J. H. Wanhill and L. Schra 23 Nov. 1983 23 p refs Presented at ASTM Symp. on Rapidy Solidified Powder Aluminum Alloys, Philadelphia, Apr. 1984
(AD-B0881466L; NLR-MP-83066-U) Avail: NTIS HC A02/MF A01

Strength, fracture toughness, fatigue strength, fatigue crack propagation resistance under constant amplitude and spectrum loading, stress corrosion crack initiation and propagation resistance, and exfoliation corrosion of the PM alloy 7091-T7E69 and the IM alloys 7075-T73, 7175-T736, 7010-T736 and 7050-T736 were compared. The PM alloy has a substantially better combination of strength and resistance to stress corrosion and exfoliation and higher notched fatigue strength at low mean stress levels and long lives. However, the fracture toughness is lower than (L-T orientation) or similar to (T-L orientation) that of the IM alloys, and the resistance to fatigue crack propagation under spectrum loading is greatly inferior. There are only minor differences in properties between the IM alloys. Author (ESA)

42 GEOSCIENCES (GENERAL)

N85-17399# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
MIZEX. A PROGRAM FOR MESOSCALE AIR-ICE-OCEAN

INTERACTION EXPERIMENTS IN ARCTIC MARGINAL ICE ZONES. 4: INITIAL RESULTS AND ANALYSIS FROM MIZEX 83

Miles G. McPhee, G. Symonds, I. Peterson, W. D. Hibler, III, and M. Lepparanta Sep. 1984 58 p
(Grant N00014-78-G-0052)
(AD-A148255; CRREL-SR-84-28) Avail: NTIS HC A04/MF A01 CSCL 08/12

Contents: Drift Velocity During the Drift-Station Phase of MIZEX 83; MIZEX 83--BIO Buoy Data Summary; MIZEX 83 Mesoscale Sea Ice Dynamics--Initial Analysis; On the Rheology of a Broken Ice Field Due to Floe Collision; Heat and Mass Balance Observations during the MIZEX 83 Drift Program; Ocean Currents and Temperatures in the Center of Fram Strait During MIZEX 83; and Arctic Whitecapping--Preliminary results. GRA

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N85-17400*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

NORTH AMERICAN VEGETATION PATTERNS OBSERVED WITH THE NOAA-7 ADVANCED VERY HIGH RESOLUTION RADIOMETER

Samuel N. Goward, Compton J. Tucker, and Dennis G. Dye [1985] 29 p refs Prepared in cooperation with Maryland Univ., College Park Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NCC5-26)
(E85-10062; NASA-TM-87402; NAS 1.15:87402) Avail: NTIS HC A03/MF A01 CSCL 02C

Spectral vegetation index measurements derived from remotely sensed observations show great promise as a means to improve knowledge of land vegetation patterns. The daily, global observations acquired by the advanced very high resolution radiometer, a sensor on the current series of U.S. National Oceanic and Atmospheric Administration meteorological satellites, may be particularly well suited for global studies of vegetation. Preliminary results from analysis of North American observations, extending from April to November 1982, show that the vegetation index patterns observed correspond to the known seasonality of North American natural and cultivated vegetation. Integration of the observations over the growing season produced measurements that are related to net primary productivity patterns of the major North American natural vegetation formations. Regions of intense cultivation were observed as anomalous areas in the integrated growing season measurements. Significant information on seasonality, annual extent and interannual variability of vegetation photosynthetic activity at continental and global scales can be derived from these satellite observations. Author

N85-17401*# Maryland Univ., College Park.

ANALYSIS OF TERRESTRIAL CONDITIONS AND DYNAMICS Progress Report, 1 Aug. 1983 - 31 Aug. 1984

Samuel N. Goward, Principal Investigator 31 Aug. 1984 17 p refs ERTS
(Contract NCC5-26)
(E85-10063; NASA-CR-174312; NAS 1.26:174312) Avail: NTIS HC A02/MF A01 CSCL 05B

Land spectral reflectance properties for selected locations, including the Goddard Space Flight Center, the Wallops Flight Facility, a MLA test site in Cambridge, Maryland, and an acid test site in Burlington, Vermont, were measured. Methods to simulate the bidirectional reflectance properties of vegetated landscapes and a data base for spatial resolution were developed. North American vegetation patterns observed with the Advanced Very High Resolution Radiometer were assessed. Data and methods needed to model large-scale vegetation activity with remotely sensed observations and climate data were compiled. B.G.

N85-17402*# Maryland Univ., College Park. Dept. of Geography.

SHORTWAVE INFRARED DETECTION OF VEGETATION

Samuel N. Goward, Principal Investigator [1985] 19 p refs Sponsored by NASA ERTS
(E85-10064; NASA-CR-174313; NAS 1.26:174313) Avail: NTIS HC A02/MF A01 CSCL 02C

The potential of short wave infrared (SWIR) measurements in vegetation discrimination is further substantiated through a discussion of field studies and an examination of the physical bases which cause SWIR measurements to vary with the vegetation type observed. The research reported herein supported the AGRISTARS program objective to incorporate TM measurements in the analysis of agricultural activity. Field measurements on corn and soybeans in Iowa were conducted, and the mean and variance of canopy reflectance were computed for each observation date. The Suits canopy reflectance model was used to evaluate possible explanations of the observed corn/soybeans reflectance patterns /39/. The SWIR measurements were shown to effectively discriminate corn and soybeans on the basis of leaf absorption properties. R.S.F.

N85-17403*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

MICROWAVE EMISSIONS FROM SNOW

A. T. C. Chang Oct. 1984 36 p refs ERTS
(E85-10065; NASA-TM-86177; NAS 1.15:86177) Avail: NTIS HC A03/MF A01 CSCL 08L

The radiation emitted from dry and wet snowpack in the microwave region (1 to 100 GHz) is discussed and related to ground observations. Results from theoretical model calculations match the brightness temperatures obtained by truck mounted, airborne and spaceborne microwave sensor systems. Snow wetness and internal layer structure complicate the snow parameter retrieval algorithm. Further understanding of electromagnetic interaction with snowpack may eventually provide a technique to probe the internal snow properties M.G.

N85-17404*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ALTIMETRY, ORBITS AND TIDES

Oscar L. Colombo Nov. 1984 183 p refs ERTS
(E85-10066; NASA-TM-86180; NAS 1.15:86180) Avail: NTIS HC A09/MF A01 CSCL 05B

The nature of the orbit error and its effect on the sea surface heights calculated with satellite altimetry are explained. The elementary concepts of celestial mechanics required to follow a general discussion of the problem are included. Consideration of errors in the orbits of satellites with precisely repeating ground tracks (SEASAT, TOPEX, ERS-1, POSEIDON, amongst past and future altimeter satellites) are detailed. The theoretical conclusions are illustrated with the numerical results of computer simulations. The nature of the errors in this type of orbits is such that this error can be filtered out by using height differences along repeating (overlapping) passes. This makes them particularly valuable for the study and monitoring of changes in the sea surface, such as tides. Elements of tidal theory, showing how these principles can be combined with those pertinent to the orbit error to make direct maps of the tides using altimetry are presented. Author

N85-17405*# Smithsonian Astrophysical Observatory, Cambridge, Mass.

INVESTIGATION OF DYNAMIC NOISE AFFECTING GEODYNAMICS INFORMATION IN A TETHERED SUBSATELLITE Semiannual Report, 1 Aug. 1984 - 31 Jan. 1985

Gordon E. Gullahorn Jan. 1985 59 p refs
(Contract NAG5-458)
(NASA-CR-174292; NAS 1.26:174292; SAR-1) Avail: NTIS HC A04/MF A01 CSCL 05B

Measurement of the gradient of the gravitational acceleration from a satellite platform is likely to provide the next improvement in knowledge of the Earth's gravity field after the upcoming Geopotential Research Mission. Observations from the subsatellite of a tethered satellite system (TSS) would increase sensitivity and resolution due to the low altitude possible. However, the TSS is a dynamically noisy system and would be perturbed by atmospheric drag fluctuations. The dynamic noise is being modeled in order to evaluate the feasibility of TSS gradiometry and to design methods of abating the error caused by this noise. The demonstration flights of the TSS are to provide an opportunity to directly observe the dynamical environment and refine modeling techniques. Random vibration analysis as a technique for modeling the TSS under atmospheric perturbation was studied. R.S.F.

N85-17406# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.
PAPERS OF THE 15TH INTERNATIONAL SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING (ISPRS) CONGRESS
1984 78 p refs Congr. held at Rio de Janeiro, Jun. 1984
(TRITA-Fmi-9; ISSN-0071-8068) Avail: NTIS HC A05/MF A01; Royal Institute of Technology, Stockholm SEK 150

Mathematical aspects of digital terrain information; comparative testing of photogrammatically sampled digital elevation models; multimodel utilization; hierarchical data structures and algorithms for digital stereoscopical mensuration; an algorithm for computation of the inverse in bundle adjustment systems; digital elevation model computation using fast Poisson solutions; and sequential data processing for photogrammetric acquisition of digital elevation models were discussed. For individual titles, see N85-17407 through N85-17413.

N85-17407# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.
MATHEMATICAL ASPECTS OF DIGITAL TERRAIN INFORMATION; REPORT FROM INTERNATIONAL SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING (ISPRS) WORKING GROUP 3:3, 1980 - 1984
Kennert Torlegaard *In its* Papers of the 15th Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Congr. 1984 p 1-5 (For primary document see N85-17406 08-43)
Avail: NTIS HC A05/MF A01

An international comparative test was organized in order to study the relations between methods for sampling the terrain in a photogrammetric stereomodel, approximation (interpolation and filtering) of the terrain surface, accuracy of derived (resampled) elevations from a digital elevation model (DEM), and the type of terrain. Ten participants measured DEMs and resampled elevations in check points for six test areas. The test areas were studied as to ways to classify the type of terrain with respect to its elevations. Author (ESA)

N85-17408# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.
A COMPARATIVE TEST OF PHOTOGRAMMETRICALLY SAMPLED DIGITAL ELEVATION MODELS
Kennert Torlegaard, Anders Oestman, and Ralf Lindgren *In its* Papers of the 15th Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Congr. 1984 p 6-23 refs (For primary document see N85-17406 08-43)
Avail: NTIS HC A05/MF A01

An international comparative test studied relations between methods for data acquisition, interpolation, resulting accuracy and type of terrain. Six test areas varying from smooth rolling farmland to very steep mountains with forest in the valleys were selected. Fifteen organizations produced digital elevation models (DEMs) from aerial photographs in scales 1:4000 to 1:30,000. The DEMs were used to derive elevations in a set of check points, the locations of which were unknown when the DEM was measured. The elevations of these check points were then compared with their true values. Systematic errors can originate from the reconstruction of the stereomodel, from the interpolation of the DEM, and from effects of vegetation height. The size and distribution of the errors are presented. Errors of functions of the DEM (e.g., slope and curvature) are also studied. Author (ESA)

N85-17409# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.
MULTIMODELS INCREASE ACCURACY: SUMMARY OF AN EXPERIMENT
Kennert Torlegaard *In its* Papers of the 15th Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Congr. 1984 p 24-33 refs (For primary document see N85-17406 08-43)
Avail: NTIS HC A05/MF A01

Photogrammetry results based on multimodels formed by averaging two or more single stereomodels are presented. The single models are calculated without correction for lens distortion, atmospheric refraction and Earth curvature. Photographs were taken from four flying altitudes, with different aircraft speed and flying directions. Accuracy was determined as rms errors, mean errors and standard deviations in planimetry and elevation. The classical theory of error propagation is confirmed. The precision of photogrammetric stereomodels can be decomposed into components related to ground coordinates, image coordinates and image motion due to aircraft speed. The accuracy improvement by multimodels is proportional to 1/root n, n = number of models. The multimodel method increase of the accuracy is similar to the additional parameters in photogrammetric block adjustment, because both methods are based on multiple photographic coverage. Author (ESA)

N85-17410# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.
HIERARCHICAL DATA STRUCTURES AND ALGORITHMS FOR DIGITAL STEREOSCOPICAL MENSURATION c35
Rune Larsson *In its* Papers of the 15th Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Congr. 1984 p 34-42 refs (For primary document see N85-17406 08-43)
Avail: NTIS HC A05/MF A01

Generalizations of hierarchical data structures are presented along with suggestions for algorithms for access to image data in varying resolution levels. The data structures are used to form a base for a system for stereoscopical mensuration including schemes for data compression, filtering, enhancement, matching, feature detection, segmentation and scene analysis. A connection to three-dimensional object representation such as a digital elevation model is discussed. Author (ESA)

N85-17411# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.
AN EFFICIENT ALGORITHM FOR THE COMPUTATION OF THE INVERSE IN BUNDLE ADJUSTMENT SYSTEMS c35
Rune Larsson *In its* Papers of the 15th Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Congr. 1984 p 43-53 refs (For primary document see N85-17406 08-43)
Avail: NTIS HC A05/MF A01

The bundle adjustment system Gentri designed to incorporate geodetic and other observations along with the photo observations and adjust them simultaneously is reviewed. The point by point processing utilized in Gentri lends itself to a straightforward computation of the band part of the inverse of the normal equations. The algorithm and data structures for that computation is presented. For each point final ground point coordinates, coordinate error estimates, image coordinate residuals, and residual error estimates (redundancy numbers) are computed in the last iteration. All necessary data are then available for blunder detection, determination of reliability and estimation of variance components (a posteriori variance estimation). Author (ESA)

N85-17412# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.
DIGITAL ELEVATION MODEL COMPUTATION USING FAST POISSON SOLUTIONS c35
Rune Larsson *In its* Papers of the 15th Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Congr. 1984 p 54-64 refs (For primary document see N85-17406 08-43)

Avail: NTIS HC A05/MF A01

Fast Poisson solutions of the five point difference approximation to Poisson's equation on a rectangular structure are presented. It is shown that these methods can be applied to digital elevation model computation given that demands on regularity are filled. Using domain decomposition the demands can be eased and allow for progressive sampling methods. The possibility to further generalize these methods is discussed. Author (ESA)

N85-17413# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Photogrammetry.

SEQUENTIAL DATA PROCESSING FOR PHOTOGRAMMETRIC ACQUISITION OF DIGITAL ELEVATION MODELS c35

Anders Oestman *In its* Papers of the 15th Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Congr. 1984 p 65-75 refs (For primary document see N85-17406 08-43)

Avail: NTIS HC A05/MF A01

A system for real-time monitoring of contours during photogrammetric data acquisition is described. Sequential algorithms corresponding to different interpolation methods are analyzed. The output of the system consists of the displayed contours, the edited observations and the elevations at the grid nodes. The edited observations can be used as input to another system which is better for the present application. In such cases, the interactive system described acts as an on-line graphical editor of the measured elevations. In other cases the elevations at the grid nodes can be used, for example when generating contour maps. Author (ESA)

N85-17414# Mitre Corp., McLean, Va.

SOLITONS AND SEASAT

K. M. Case Aug. 1984 26 p

(Contract F19628-84-C-0001)

(AD-A148396; JSR-84-203D) Avail: NTIS HC A03/MF A01 CSCL 20/4

It has been suggested that Soliton formation might be relevant to SEASAT observations. It has also been said that there are no Solitons in more than one space dimension. The second statement is demonstrated to be false. The Kadomtsev-Petviashvile equation relevant to Internal Waves is shown not to have Soliton solutions. This lends support to the view that Solitons and SEASAT have little in common. Author (GRA)

N85-17415# Army Cold Regions Research and Engineering Lab., Hanover, N. H.

DEUTERIUM DIFFUSION IN A SOIL-WATER-ICE MIXTURE

J. L. Oliphant and A. R. Tice Sep. 1984 15 p

(AD-A148457; CRREL-SR-84-27) Avail: NTIS HC A02/MF A01 CSCL 08/12

An experiment was performed to determine the rate of equilibration of deuterium between the ice and liquid phases of water in partially frozen soil. The results of this experiment are consistent with a diffusion rate of deuterium in ice of 1 or .0000000002 sq cm/s. A method for calculating the approximate equilibration time, given the size of the ice crystals in the system, is provided. This calculation compares well with the experimental results. GRA

N85-17416# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.

THE USE OF PRINCIPAL COMPONENTS ANALYSIS TECHNIQUES NIMBUS-7 COASTAL ZONE COLOR SCANNER DATA TO DEFINE MESOSCALE OCEAN FEATURES THROUGH A WARM HUMID ATMOSPHERE Final Report

Ronald J. Holyer and Paul E. LaViolette Apr. 1984 78 p Original contains color illustrations

(AD-A148567; NORDA-60) Avail: NTIS HC A05/MF A01 CSCL 08/10

The Nimbus-7 Coastal Zone Color Scanner (CZCS) has the unique potential to remotely sense mesoscale ocean features through warm, humid atmospheres that are opaque to thermal infrared sensors. The major obstacle to the use of these data is the masking effect of sunlight backscattered by the atmosphere. This study details a new atmospheric correction method, employing principal component analysis techniques, that effectively removes the atmospheric radiance from CZCS images of the ocean. The method has the advantage of ease of use and, hence, allows the CZCS data to be incorporated into routine naval environmentally-oriented operations. The study shows the method to be especially effective in the descriptive analyses of mesoscale oceanic phenomena. Four examples of the use of the technique are presented for three different ocean areas. GRA

N85-17417# General Electric Co., Lanham, Md. Space Systems Div.

INTERACTIVE DIGITAL IMAGE PROCESSING FOR TERRAIN DATA EXTRACTION Final Technical Report, Nov. 1983 - Sep. 1984 on Phase 5

Howard Heydt, Vijay Karkhanis, and Chris Peterson Sep. 1984 70 p

(Contract DAAK70-79-C-0153)

(AD-A148580; ETL-0374) Avail: NTIS HC A04/MF A01 CSCL 20/6

Some techniques were investigated for extracting terrain surface roughness data from digital aerial imagery. Measurement of tonal changes in the imagery is one feasible approach. A digital image data base was assembled containing 10 image planes, 4096 x 4096 pixels/plane, 8 bits/pixel. The planes contain Landsat Thematic Mapper image data, four digitized aerial photos which were rectified, registered to the Thematic Mapper image and mosaicked, and digitized aerial radar imagery, all for the same scene. From the digital photomosaic, open water and forested areas were extracted using a gray level-texture classification. GRA

N85-17418# Research Inst. of National Defence, Linkoeping (Sweden).

ADVANCED TECHNOLOGY FOR HYDROGRAPHIC MAPPING

Ove Steinvall, Tomas Claesson, Joergen Lexander, John O. Klepsvik (Continental Shelf Institute), and Jan Christian Blankenburg (Continental Shelf Institute) Sep. 1984 195 p refs Sponsored by Nordic Fund for Technology and Industrial Development, Swedish Board for Technical Development and Royal Norwegian Council for Science and Industrial Research

(FOA-C-30371-E1; ISSN-0347-3708) Avail: NTIS HC A09/MF A01; Research Institute of National Defence, Stockholm KR 75

An integrated hydrographic charting system consisting of acoustical and laser optical sensors is proposed. The system consists of a sidescan sonar, a multibeam echo sounder, and a scanning laser bathymeter. The sensors represent airborne, surface and subsurface modes. Their bathymetric use covers navigational charting surveys, civil engineering surveys, and exploration surveys. Author (ESA)

N85-17419# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Infrarottechnik.

SENSOR-ATMOSPHERE-TARGET SIMULATION. COMPUTER PROGRAM SENSAT

Rudolf Richter Sep. 1984 86 p refs In GERMAN; ENGLISH summary

(DFVLR-FB-84-32) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 23,50

A simulation model with three components (passive electrooptical sensor, atmosphere and surface) is presented. The model is valid for the spectral range 0.25 to 28.5 micrometers and uses the program LOWTRAN6 for computing the atmosphere. The radiation equations for cases with up to two reflecting and emitting surfaces and a radiation source within the sensor's instantaneous field of view are given. The computer program SENSAT is recommended for performing analyses for missions of sensors on different platforms (ground, tower, aircraft or satellite). Author (ESA)

N85-17420# Battelle Inst., Frankfurt am Main (West Germany). Fachbereich Laser und Optik.

DEVELOPMENT OF AN AIRBORNE MEASURING SYSTEM FOR REMOTE SENSING OF EARTH SURFACE AND ATMOSPHERE, SPECTROSCOPIC INVESTIGATIONS Final Report, Jan. 1978
Joerg Boscher Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 134 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-84-029; ISSN-0170-1339) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 28

The absorption cross sections of ethylene, ammonia, benzene, Freon-11, Freon-12, Freon-13, sulfur dioxide, and vinyl chloride were measured, using a dual beam technique. The analytic measurements were performed for 111 emission lines of the 12C16O2 and 12C18O2 laser in pure gases and in mixtures with synthetic air at various pressures and temperatures. A laser with isotopic gas mixture was designed and applied for the investigation of SO2. Based on the > 2500 data points obtained, detailed conclusions were drawn concerning the minimum detectable concentrations and the possible interference of the gases. Results show that several important trace gases can be monitored with high sensitivity using the differential absorption technique.
Author (ESA)

N85-17222*# Radio Research Labs., Tokyo (Japan).
REMOTE SENSING OF RICE FIELDS AND SEA POLLUTION BY SIR-B
N. Fugono, Y. Furuhama, T. Takasugi, K. Okamoto, M. Fujita, S. Yoshikado, H. Masuko, T. Shinozuka, H. Inomata, and I. Shiro *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17I

N85-17224*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SIR-B INTERFEROMETRIC TOPOGRAPHY
R. M. Goldstein and F. K. Li *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 2 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 05B

N85-17225*# Canada Centre for Remote Sensing, Ottawa (Ontario).
USE OF SIR-B MULTIINCIDENCE-ANGLE IMAGERY TO STUDY ICEBERG DETECTABILITY AND OFFSHORE OCEAN FEATURE EXTRACTION
A. L. Gray, J. Princz, C. E. Livingstone, R. K. Hawkins, M. Wong, D. Pearson (Petro-Canada Exploration, Inc., Calgary, Alberta), J. Gower (Inst. of Ocean Sciences, Sydney, British Columbia), T. F. Mullane (Atmospheric Environment Service, Ottawa), and R. O. Ramseier (Atmospheric Environment Service, Ottawa) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08L

N85-17228*# Purdue Univ., Lafayette, Ind.
MICROWAVE AND OPTICAL REMOTE SENSING OF FOREST VEGETATION
R. M. Hoffer, M. E. Bauer, L. L. Biehl, and R. P. Mroczynski *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 02F

N85-17231*# Illinois Univ., Urbana.
INTERLOBATE COMPARISON OF GLACIAL-DEPOSITIONAL STYLE AS EVIDENCED BY SMALL-RELIEF GLACIAL LANDSCAPE FEATURES IN ILLINOIS, INDIANA, AND OHIO, UTILIZING SIR-B
W. H. Johnson, N. K. Bleuer (Geological Survey, Bloomington, Ind.), G. S. Fraser (Geological Survey, Bloomington, Ind.), and S. M. Totten (Hanover Coll., Ind.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08L

N85-17234*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SIR-B CARTOGRAPHY AND STEREO TOPOGRAPHIC MAPPING
M. Kobrick, F. Leberl (Inst. for Image Processing and Computer Graphics), J. Raggam (Image Processing and Computer Graphics), G. Domik (Image Processing and Computer Graphics), R. Welch (Georgia Univ., Athens), H. Carr (Naval Observatory, Washington, D.C.), J. Hammak (Naval Observatory, Washington, D.C.), V. Kaupp (Arkansas Univ., Fayetteville), H. C. MacDonald (Arkansas Univ, Fayetteville), W. P. Waite (Arkansas Univ., Fayetteville) et al *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08B

N85-17239*# Kansas Univ. Center for Research, Inc., Lawrence.
INFORMATION FOR SPACE RADAR DESIGNERS: REQUIRED DYNAMIC RANGE VS RESOLUTION AND ANTENNA CALIBRATION USING THE AMAZON RAIN FOREST
R. K. Moore and V. S. Frost *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1985 3 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 02F

N85-17240*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DEVELOPMENT AND EVALUATION OF TECHNIQUES FOR USING COMBINED MICROWAVE AND OPTICAL IMAGE DATA FOR VEGETATION STUDIES
J. F. Paris, B. N. Rock, and S. Y. Hsu (Susquehanna Resource and Environment, Inc.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 02F

N85-17241*# Analytic Sciences Corp., Reading, Mass.
INVESTIGATION OF SIR-B IMAGES FOR LITHOLOGIC MAPPING
J. T. Parr and R. V. Sailor *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 2 p ref (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08B

N85-17242*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AUTOMATIC TERRAIN ELEVATION MAPPING AND REGISTRATION
H. K. Ramapriyan, C. W. Murray, J. P. Strong, and H. W. Blodget *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08B

N85-17244*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
APPLICATION AND CALIBRATION OF THE SUBSURFACE MAPPING CAPABILITY OF SIR-B IN DESERT REGIONS
G. G. Schaber, J. F. McCauley, C. S. Breed, M. J. Grolier, B. Issawi (Egyptian Geological Survey and Mining Authority), C. V. Haynes (Arizona Univ., Tucson), W. McHugh (GAI Consultants), A. S. Walker (Geological Survey, Reston, Va.), and R. Blom *In its* The SIR-B Sci. Invest. Plan 1 Jul. 1984 5 p refs Prepared in cooperation with Geological Survey, Flagstaff, Ariz. (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08B

N85-17246*# California Univ., Santa Barbara.
THE EXTENSION OF AN INVERTIBLE CONIFEROUS FOREST CANOPY REFLECTANCE MODEL USING SIR-B AND LANDSAT DATA
D. S. Simonett and A. H. Strahler (City Univ. of New York) *In* JPL The SIR-B Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 02F

N85-17248*# Nevada Univ., Reno.
ANALYSIS OF SIR-B RADAR ILLUMINATION OF GEOMETRY FOR DEPTH OF PENETRATION AND SURFACE FEATURE AND VEGETATION DETECTION, NEVADA AND CALIFORNIA
J. V. Taranik, D. B. Siemmons, E. J. Bell, M. Borengasser, T. P. Lugaski, H. Vreeland, P. Vreeland, E. Kleiner, F. F. Peterson, and H. Kleiforth *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 02F

N85-17252*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REMOTE SENSING OF SOIL MOISTURE
J. R. Wang, J. C. Shiue, T. J. Schmugge, P. Cuddapah, T. J. Jackson (Dept. of Agriculture, Beltsville, Md.), and T. Mo (Computer Sciences Corp., Silver Spring, Md.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08M

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N85-17421*# Toledo Univ., Ohio.
THERMAL-STRESS ANALYSIS FOR A WOOD COMPOSITE BLADE Final Report
Kuan-Chen Fu and Awad Harb Jul. 1984 119 p refs
(Grant NAG3-373; Contract DE-AI01-79ET-20320)
(NASA-CR-174794; DOE/NASA/0373-1; NAS 1.26:174794) Avail: NTIS HC A06/MF A01 CSCL 20K

A thermal-stress analysis of a wind turbine blade made of wood composite material is reported. First, the governing partial differential equation on heat conduction is derived, then, a finite element procedure using variational approach is developed for the solution of the governing equation. Thus, the temperature distribution throughout the blade is determined. Next, based on the temperature distribution, a finite element procedure using potential energy approach is applied to determine the thermal-stress distribution. A set of results is obtained through the use of a computer, which is considered to be satisfactory. All computer programs are contained in the report. B.W.

N85-17422*# United Technologies Corp., South Windsor, Conn. Power Systems Div.
ELECTRIC UTILITY ACID FUEL CELL STACK TECHNOLOGY ADVANCEMENT Final Report
J. V. Congdon, G. J. Goller, G. J. Greising, J. J. OBrien, S. A. Randall, G. J. Sandelli, R. D. Breault, G. W. Austin, S. Bopse, and R. D. Coykendall Nov. 1984 158 p refs
(Contracts DEN3-191; DE-AI21-80ET-17088)
(NASA-CR-174804; DOE/NASA/0191-1; NAS 1.26:174804; FCR-4684F) Avail: NTIS HC A08/MF A01 CSCL 10A

The principal effort under this program was directed at the fuel cell stack technology required to accomplish the initial feasibility demonstrations of increased cell stack operating pressures and temperatures, increased cell active area, incorporation of the ribbed substrate cell configuration at the bove conditions, and the introduction of higher performance electrocatalysts. The program results were successful with the primary accomplishments being: (1) fabrication of 10 sq ft ribbed substrate, cell components including higher performing electrocatalysts; (2) assembly of a 10 sq ft, 30-cell short stack; and (3) initial test of this stack at 120 psia and 405 F. These accomplishments demonstrate the feasibility of fabricating and handling large area cells using materials and processes that are oriented to low cost manufacture. An additional accomplishment under the program was the testing of two 3.7 sq ft short stacks at 12 psia/405 F to 5400 and 4500 hours respectively. These tests demonstrate the durability of the components and the cell stack configuration to a nominal 5000 hours at the higher pressure and temperature condition planned for the next electric utility power plant. R.S.F.

N85-17423# Naval Surface Weapons Center, White Oak, Md.
NEW LIQUID CATHODES FOR LITHIUM BATTERIES. PART A: HALOCARBONS
K. M. ONeill, S. D. James, and P. H. Smith May 1984 31 p
(DA Proj. ZR0-001; DA Proj. ZR0-1301)
(AD-A148433; NSWC/TR-84-178-Pt-A) Avail: NTIS HC A03/MF A01 CSCL 10/3

Several halocarbons were selected for characterization as cathodes for lithium batteries after chemical stability testing with Li metal. Further testing comprised shock sensitivity with lithium, conductivity of halocarbon electrolytes, and the discharge behavior of assembled Li battery packs at 1ma/sq cm. Halocarbons were found to be much less shock sensitive with lithium than presently used sulfur oxychlorides. A literature search has revealed that they are also less toxic. The discharge capacity for 1,1,2,2-tetrachloroethane (2.8 AH/g carbon) exceeded that of thionyl chloride (2.2 AH/g carbon). These results show promise for the use of halocarbons in safer lithium batteries. Author (GRA)

N85-17424# Rasor Associates, Inc., Sunnyvale, Calif.
CLOSE-SPACED HIGH TEMPERATURE KNUDSEN FLOW Annual Report, 1 Feb. 1983 - 15 May 1984
J. B. McVey 15 Jun. 1984 19 p
(Contract F49620-83-C-0068)
(AD-A148477; NSR-22-2; AFOSR-84-1070TR) Avail: NTIS HC A02/MF A01 CSCL 10/2

This work is a study of discharge processes in Knudsen mode (collisionless), thermionic energy converters. Areas of research involve mechanisms for reducing the effects of electron space charge in such devices. Such mechanisms are essential for thermionic converters to produce useful current and power densities. The mechanisms we have chosen to study are: reduction of space-charge through a very close interelectrode gap (less than 10 microns); transport and retention of positive cesium ions generated by surface ionization; transport of positive cesium ions generated in an arc external to the electrodes; and the mechanism for enhanced current output due to a structured emitter in a mixed barium-cesium vapor. This last process may involve the production of barium-cesium dimer ions. The experimental work used SAVTEC (Self-Adjusting, Versatile Thermionic Energy Converter) diode structures, which were tested in a chamber containing 0.1-1.0 torr of cesium vapor. Comparison of measured volt-ampere curves with theory gave excellent agreement and indicated an interelectrode gap of 6.5 microns at an emitter temperature of 1250 K. A theoretical model of the collisionless thermionic diode was developed which included surface ionization, auxiliary ions from an external source, and trapping of charged particles in potential wells due to infrequent collisions. Studies show that trapping of positive ions leads to a large, beneficial increase in current density. GRA

N85-17425# Department of the Navy, Washington, D. C.
BATTERY CHARGER Patent Application
S. W. Vreeland, inventor (to Navy) Filed 30 Jul. 1984 23 p
(AD-D011420; US-Patent-Appl-SN-636038) Avail: NTIS HC A02/MF A01 CSCL 10/2

A battery charger analyzer utilizing a down pulse configuration employs a number of power switching transistors driven from a pulse-width modulator in a control section which monitors and analyzes the battery temperature, charge condition, current provided, and length of time in the charge cycle, all of which affect the operation of the pulsewidth modulator and thereby the charge supplied to the battery. The charger analyzer supplies 95%

of the battery charge at either of two selected charging rates.
Author (GRA)

N85-17426# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany). Abteilung Raumfahrttechnik und Faserverbundprojekte.
BLADE TECHNOLOGY PROGRAM FOR LARGE WIND TURBINES, PHASE 1 Final Report, Mar. 1983
Dieter Muser Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 235 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-217; ISSN-0340-7608) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 40

A research program for the development and construction of rotor blades is presented. The project includes investigation and design of blade concepts, compilation of materials properties of fiber reinforced plastics, and manufacturing and testing of critical blade sections. The following parts are produced and tested to check the manufacturing technology: element for load introduction, shell section in sandwich-spar technology, filament-wound D-spar in carbon fiber reinforced epoxy, and filament-wound D-spar with rear profile box in tube-winding technology. It is shown that the carbon and glass fiber reinforced plastics blade with wound D-spar is optimum. This blade has the lowest mass that can be economically manufactured by automatic filament winding. Author (ESA)

N85-17427# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Dept.
LIFE ASSESSMENT AND DAMAGE TOLERANCE OF WIND TURBINES
R. J. H. Wanhill 29 Nov. 1983 12 p refs Presented at ICF6 Workshop, New Delhi, 4-10 Dec. 1984
(AD-B088148L; NLR-MP-83072-U) Avail: NTIS HC A02/MF A01 CSCL 10/2

Safe and durable operation of fatigue critical structures in high technology windmills, including safe life assessment and possible application of damage tolerance principles was surveyed. A research program to assist safe and durable operation of windmill rotors in the Netherlands is reviewed. Author (ESA)

N85-17428# AEG-Telefunken, Wedel (West Germany). Anlagentechnik Aktiengesellschaft.
DEVELOPMENT OF A FOLDLINE CONCEPT FOR AUTOMATIC REFOLDING OF A FLEXIBLE BLANKET (FOLDING ANALYSIS) Final Report
W. Schmitz and T. Hempel Paris ESA 1984 149 p refs
(Contract ESTEC-5198/82/NL-PB(SC))
(ESA-CR(P)-1933) Avail: NTIS HC A07/MF A01

The technical viability of a solar array refolding system was established and a mathematical model to give input data and suggestions for the manufacture of test samples was developed. Steps leading to the design parameters of the larger demonstration model are described together with the final outlook resulting from the functional investigation of this object. The basic elements of the refolding system are blanket-integrated springs, which perform deflections normal to the blanket plane when the pre-tension is applied. The stiffness of these springs must be lower than that of the blanket since a relatively great spring-way is required to support large deflections in the fold line area for defined refolding.
Author (ESA)

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N85-17429 United Kingdom Atomic Energy Authority, Risley (England).
SOMETHING IN THE AIR AT WINDSCALE
Francoise Harrois-Monin 17 Aug. 1984 14 p Transl. into ENGLISH from Sci. et Vie (France), no. 796, Feb. 1984
(BLL-Risley-Tr-4998-(9091.9F)) Avail: British Library Lending Div., Boston Spa, England

Contamination of seaweed and silt in the Irish Sea, and the death of at least 1,000 people is attributed to contamination by Polonium 210, Iodine 131, and Plutonium 239 from the Sellafield Nuclear Complex in England. The incidence of leukemia in children is ten times normal and 250 cases of thyroid cancer were reported in the area. The history of this facility is related includings its fires, accidental discharges into the atmosphere, and nonconformance with safety standards. A.R.H.

N85-17430 British Gas Corp., London (England).
COMPARATIVE USEFULNESS OF FLUE GAS OXYGEN AND CARBON DIOXIDE ANALYSIS
T. Horn 1984 10 p refs Transl. into ENGLISH from Gas Waerme Int (West Germany), v. 33, no. 4, Apr. 1984 p 147-150
(BLL-Trans-T6358/BG/WH783/84) Copyright. Avail: British Library Lending Div., Boston Spa, England

For the assessment of furnace equipment, the flue gas is usually examined. Flue gas losses and firing efficiency permit conclusions to be made about the excess of air. Oxygen concentration (O2 measurement) in the flue gas yields more information and is shown to be more precise than the determination of the carbon dioxide concentration (CO2 measurement). B.G.

N85-17431 British Gas Corp., London (England).
DETERMINATION OF THE LAWS GOVERNING THE CHANGES IN THE STANDARD DEVIATIONS OF THE DISTRIBUTION OF POLLUTION BASED ON OBSERVATIONS OF THE ATMOSPHERIC TURBULENCE SPECTRUM AND THE POSSIBILITY OF SIMULATING IT IN THE LABORATORY
B. Carbol (CEA, Fontenay-aux-Roses, France) 1984 33 p refs Transl. into ENGLISH of Conf. Paper, 1980 33 p Presented at the Seminar on Radioactive Releases and Their Dispersion in the Atmosphere Following a Hypothetical Reactor Accident, Riso, Denmark, 22-25 Apr. 1980
(BLL-Tr-T6373/BG/MRS14883/84) Avail: British Library Lending Div., Boston Spa, Engl.

Large scale and small scale turbulences behave differently as a function of the mean wind speed. Small scale turbulence is directly related to this parameter, whereas large scale turbulence is independent of it. Using Taylor's calculation, which takes account of the low-pass filter effect of the transfer time on the value for the standard deviation of particle dispersion, a high-pass filter is introduced which translates the effect of the time of observation, by definition finite, onto the true atmospheric scale. It is then possible to identify those conditions under which the relations governing variation of the standard deviations of pollution distribution are dependent upon: the distance of transfer alone; the time of transfer and the wind speed; and the time of transfer alone. Making certain simplifying assumptions, practical quantitative relationships are deduced for the variation of the horizontal standard deviation of pollution dispersion as a function of wind speed and time of transfer. M.G.

N85-17432# Gaz de France, La Plaine Saint Denis. Dept. of Liquefield Methane and Special Trials.
PENETRATION OF THE ATMOSPHERE BY FLAMMABLE MIXTURES AS A RESULT OF SPILLAGE OF LNG ON THE GROUND
R. Humbert-Basset and A. Montet [1984] 30 p
Avail: NTIS HC A03/MF A01

The hazards which would occur from a spillage of liquified natural gas on the ground without immediate ignition were investigated by measuring the evaporation rates of L.N.G. on various soils in order to ascertain the values for the instantaneous gas outflox being released in the first minutes of the spill; and by observing and measuring the extent of the clouds generated from spillages in diked areas up to 200 sq m. Results show that, for such areas, the extent of the flammable zone is limited to a few tenth meters. The tendancy of the cloud to rise in the atmosphere was observed and checked by computing the experimental data

with a modified theoretical formula which was then applied the propagation of the mixtures generated by spilling into large areas. It is concluded that an important extent of a flammable mixture would only happen with the occurence at the same time of various events such as: large failure from a L.N.G. tank, large quantities of L.N.G. flooding suddenly the whole diked area, greatest stability of the air, and moderate wind velocity. A.R.H.

N85-17433*# Tennessee Univ. Space Inst., Tullahoma. Div. of Atmospheric Science.

NATURAL ENVIRONMENT ANALYSIS

Jan. 1985 67 p refs

(Contract NAS8-35973)

(NASA-CR-174330; NAS 1.26:174330) Avail: NTIS HC A04/MF A01 CSCL 13B

Qualitative analyses (and quantitatively to the extend possible) of the influence of terrain features on wind loading of the space shuttle while on the launch pad, or during early liftoff, are presented. Initially, the climatology and meteorology producing macroscale wind patterns and characteristics fot he Vandenburg Air Force Base (VAFB) launch site are described. Also, limited field test data are analyzed, and then the nature and characteristic of flow disturbances due to the various terrain features, both natural and man-made, are then reviewed. Following this, the magnitude of these wind loads are estimated. Finally, effects of turbulence are discussed. The study concludes that the influence of complex terrain can create significant wind loading on the vehicle. Because of the limited information, it is not possible to quantify the magnitude of these loads. B.W.

N85-17434# Air Force Engineering and Services Center, Tyndall AFB, Fla.

AIR QUALITY ASSESSMENT MODEL VALIDATION IN COMPLEX TERRAIN Final Report, Oct. 1981 - Sep. 1983

A. M. Wachinski, D. R. Crow, J. D. Dustin, and G. D. Seitchek Aug. 1984 75 p

(AD-A147690; AFESC/ESL-TR-84-16) Avail: NTIS HC A04/MF A01 CSCL 13/2

This research was conducted to validate the USAF Air Quality Assessment Model (AQAM) for use in measuring environmental impacts of coal conversion projects for Air Force heating and power plants located in a complex terrain scenario. The first step in the project was to conduct a tracer gas study and gather data to approximate the exhaust plume of the heating plant being studied. The tracer study methodology is discussed. The rationale behind the sampling network design, and the procedures used to gather the necessary meteorological data are also covered. The next step was to input the known meteorological conditions and source characteristics to both AQAM and the environmental protection agency's model, COMPLEX 2. Both of these models are described. Of particular concern are those parameters which can have a significant impact on the predicted results. GRA

N85-17435# Argonne National Lab., Ill. Air Resources Section.

IMPACT OF AIRCRAFT EMISSIONS ON AIR QUALITY IN THE VICINITY OF AIRPORTS. VOLUME 3: AIR QUALITY AND EMISSION MODELING NEEDS Final Report

Donald M. Rote Jan. 1984 122 p Sponsored in part by AF 4 Vol.

(Grant DTFA01-83-4-10556)

(AD-A147951; FAA/EE-84-13; AFESC/ESL-TR-84-35) Avail: NTIS HC A06/MF A01 CSCL 09/2

The first part of this report addresses the status of the AVAP (Airport Vicinity Air Pollution) model and AQAM (Air Quality Assessment Model) from the perspective of the modeling requirements of users concerned with air-quality problems in civilian and military aviation. Brief descriptions of the types of problems likely to be encountered is followed by a detailed discussion of those characteristics of the problems that determine the technical requirements for the applicable computation procedures or models. This is followed by a discussion of the operational or user requirements of the models. Then a review and evaluation of the AVAP model and AQAM is given that includes a discussion of their intended uses, strengths, and weaknesses. The methods used by the two models to treat various aspects of the emission and dispersion are compared, and the best methods are selected, or alternatives are recommended where appropriate. The latter portion of the report addresses the future needs. Because of the number of interrelated problems and decisions required to meet these needs, a systematic approach to the problem in the form of a decision tree is presented. The final section contains an outline of a proposed new computational system that should alleviate at least some of the problems identified in earlier sections. Two objections were paramount in the new design: to make the model easier to use and to be able to implement the model on modern, small computers. GRA

N85-17436# Argonne National Lab., Ill. Energy and Environmental Systems Div.

IMPACT OF AIRCRAFT EMISSIONS ON AIR QUALITY IN THE VICINITY OF AIRPORTS. VOLUME 4. NITROGEN DIOXIDE AND HYDROCARBONS Final Report, Jul. 1980 - Apr. 1984

Kenneth L. Brubaker, Mehul Dave, Ronald J. Wingender, and Richard D. Flotard Apr. 1984 158 p

(Contract DTFA01-83-Y-10556)

(AD-A148253; FAA/EE-84-14; AFESC/ESL-TR-84-36) Avail: NTIS HC A08/MF A01 CSCL 13/2

This report documents the results of three related studies conducted to assess the impact of aircraft emissions of nitrogen oxides (NOx) and hydrocarbons (Hc) on air quality. The first study consisted of a field program carried out at O'Hare International Airport and an associated model development program, the purposes of which were to assess the effect of aircraft NOx emissions on ambient 1-hour concentrations of nitrogen dioxide (NO2) and to provide a dispersion model suitable for the prediction of such concentrations. The second study involved the collection and laboratory analysis of samples of hydrocarbons in ambient air contaminated by jet aircraft exhaust, together with a determination of the type and relative amounts of the various hydrocarbons detected. The third study consisted of an analysis, based on available data in the literature, of the potential role of aircraft hydrocarbon emissions in the production of photochemical smog. The available literature dealing with the issue of aircraft contributions to photochemical smog has been reviewed and is discussed. At present, the available information is insufficient to evaluate the effect quantitatively. The requirements for further work that would enable a quantitative evaluation to be made are discussed. GRA

N85-17437# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.

A NEW FAST RESPONSE PROBE FOR DIFFUSION STUDIES IN ATMOSPHERIC AIR

B. W. Boreham May 1984 45 p refs

(IC-Aero-84-01; ISSN-0308-7247) Avail: NTIS HC A03/MF A01

A fast response, Langmuir-type flux-measuring probe for diffusion studies in atmospheric air was developed for wind tunnel scale modeling of the time dependent behavior of the concentration distribution of neutral buoyancy contaminants originating from puffs and plumes interacting with the atmosphere. Unlike aspiration-type probes, this instrument can be used to make accurate concentration measurements without prior knowledge of the velocity field. A theoretical model of probe operation is developed and good agreement is obtained between the calculated and observed operating characteristics. Response time is of the order of 1 msec or less. Author (ESA)

N85-17438# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).

MODELING OF TURBULENT DISPERSION OF NEUTRAL AND BUOYANT CONTAMINANTS RELEASED FROM TWO DIMENSIONAL SOURCES

C. Benocci, D. Olivari, and E. Vergison (Solvay and Cie) Mar. 1984 50 p refs Sponsored by Bureau International Technique du Chlore

(VKI-TN-150) Avail: NTIS HC A03/MF A01

The dispersion of neutral and buoyant scalars was simulated

by the release of random markers. Marker displacement in turbulent shear flows is modeled on the basis of the theory of continuous stochastic processes and the concentration of the dispersed species estimated averaging over control volumes proportional to the physical length scales of the phenomenon. Predictions were compared with sets of experimental data for dispersion in turbulent boundary layers and good agreement is consistently found.
Author (ESA)

N85-17439# Delft Hydraulics Lab. (Netherlands).
IDENTIFICATION AND PARAMETER ESTIMATION OF PHOSPHATE BALANCE MODELS IN DRINKING WATER RESERVOIRS
H. Koppelman and T. Schilperoort Apr. 1984 18 p refs Presented at Spec. Topics Conf. on Hydrol., Geophys. and Spatial Time Ser., Toronto, 10-14 Aug. 1983
(Publ-313) Avail: NTIS HC A02/MF A01

An off-line and an on-line parameter estimation method were applied to different models describing a reservoir system. Most information about the validity of the models is provided by the on-line method. Its ability to show any time variation in the parameter estimates which is not consistent with the underlying physics makes it very suitable for model structure evaluation. The behavior of the parameters may suggest additional or alternative hypotheses and confirm relations between parameters and measured variables. Compared to the off-line method, the on-line method is more sensitive to the choice of initial conditions and noise variances. These variances are much more difficult to estimate. Divergence of the on-line algorithm can be reduced by using the results of the off-line method as initial conditions for the on-line method.
Author (ESA)

N85-16980*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE ON-ORBIT CONTAMINATION AND ENVIRONMENTAL EFFECTS
L. J. Leger, S. Jacobs, H. K. F. Ehlers, and E. Miller *In its* Space shuttle Tech. Conf., Pt. 2 Jan. 1985 p 1082-1094 refs (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 13B

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N85-17440 Utah Univ., Salt Lake City.
DETERMINATION OF CRUSTAL AND UPPER MANTLE STRUCTURE FROM ANALYSIS OF BROADBAND TELESEISMIC P-WAVEFORMS Ph.D. Thesis
Thomas Joseph Owens 1984 159 p
Avail: Univ. Microfilms Order No. DA8421841

Time-domain inversion of broadband radial receiver functions is evaluated as a mean of estimating the shear velocity structure in the vicinity of an isolated seismic station. The receiver functions are developed from teleseismic P-waveforms using a source equalization deconvolution that effectively replaces the complex earthquake source with a simple Gaussian pulse. Stacking receiver functions from earthquakes clustered in distance and back aximuth from the station provides an estimate of the variability of the mean receiver function. The time-domain inversion routine utilizes the mean radial receiver function to determine the structure assuming a crustal model parameterized by many thin, flat-lying, homogeneous layers. Lateral changes in structure are identified by examining azimuthal variations in the vertical structure. The technique is applied to two broadband seismic stations.
Dissert. Abstr.

N85-17441 Rutgers - The State Univ., New Brunswick, N. J.
SOIL FORMATION ON TERTIARY LANDSURFACES OF THE NEW JERSEY COASTAL PLAIN Ph.D. Thesis
John Joseph Treia 1984 643 p
Avail: Univ. Microfilms Order No. DA8424168

Soils with unusual morphologies have developed in gravelly stratified sediments of the Beacons Hill formation. Six sites are examined in detail: five are bisequel and have sand or loamy sand A horizons with a well-developed Podzol (Spodosol) morphology overlying a thick, highly weathered reddish (5 YR 5/8) sandy clay loam B that is often a hardpan; one soil has an intense red (5 R 3/8) sandy clay loam B with an iron-indurated crust. Four sites also exhibit highly disrupted morphology suggesting frost action or other processes while three have more than one clay maximum. Soil pH ranges from 3.5 to 4.9. Maximum values for extractable soil Al and Fe were 1 and 3% respectively. Gravel and sand fractions are dominatly quartz lacking detectable weatherable components. Silts are dominantly quartz with some kaolinite, mica, vermiculite, and goethite in the finer fractions. These soils may be relicts of previous warm climates, or they may be the product of protracted cycles of soil formation on old, stable Tertiary land surfaces under climates essentially similar to the present.
Dissert. Abstr.

N85-17442 Brown Univ., Providence, R. I.
MODELING OF LARGE-SCALE ACCRETIONARY WEDGE AND THIN-SKINNED TRUST-AND-FOLD BELT MECHANICS Ph.D. Thesis
Glen Stanley Stockmal 1984 283 p
Avail: Univ. Microfilms Order No. DA8422486

The large-scale mechanics of accretionary wedges and thrust-and-fold belts are modeled assuming that they deform plastically under plane-strain conditions. Using plastic slip-line theory and a numerical finite-difference approach, three fundamental tectonic problems are considered: (1) Determination of stress and velocity fields within an active accretionary wedge (modeled as a pressure-independent von Mises material) of known cross-sectional configuration. (2) Construction of the critical surface topography required for plastic yield of a wedge with a general failure criterion (inclusion of both pressure-dependent and independent components) above a basal decollement of known strength and geometry. (3) Application of the critical topography concept to a presently inactive thrust belt to reconstruct the cross sectional configuration when the belt was actively deforming.
Dissert. Abstr.

N85-17443 Colorado Univ., Boulder.
CHRONOLOGIC AND CLIMATIC CONTROL ON SOIL DEVELOPMENT, NORTHERN BIGHORN BASIN, WYOMING AND MONTANA Ph.D. Thesis
Marith Cady Reheis 1984 366 p
Avail: Univ. Microfilms Order No. DA8422640

Four soil chronosequences in the northern Bighorn Basin develop at different rates in different climates. Soils along Rock Creek are formed in granitic glaciofluvial terrace deposits. Multivariate statistics show that properties develop at power or logarimthmic rates in mountain-front soils (cool moist climate), whereas properties of basin soils (semiarid climate) develop at logarithmic or linear rates. The Kane fan soils (arid climate) are formed in calcareous alluvial deposits of Cottonwood Creek and develop at linear rates. Linear age trends of A-horizon properties in semiarid and arid climates reflect the cumulative addition of aerosolic dust, whereas log or power trends in basin B horizons and in all mountain-front horizons are attributed to decreasing rates of chemical weathering with time. The strongest climatic differences among the chronosequences are: (1) log or power rates of soil development in moist areas, as opposed to linear rates in dry areas; (2) $CaCO_3$ and gypsum accumulation in semiarid and arid soils respectively; and (3) clay mineralogy.
Dissert. Abstr.

N85-17444 Purdue Univ., Lafayette, Ind.
POST-LARAMIDE HISTORY OF NORTH CENTRAL WYOMING Ph.D. Thesis
James Jan Piegat 1984 130 p
Avail: Univ. Microfilms Order No. DA8423412

This study evaluated the assumptions on which the history of North Center Wyoming was based and developed a new set of assumptions in keeping with recent advances. Assumptions previously used include: (1) physiolographic and orogenic mountains originate at the same time and from the same processes; (2) all significant deformation occurred during the Laramide Orogeny; (3) all streams transverse to structure were superposed from the highest level of basin fill; and (4) the Subsummit Peneplain is a pediment and represent the maximum level of basin fill. Recently developed assumption include: (1) physiographic mountains are not necessarily as old as the orogenic structures they contain; (2) significant deformation has occurred in post-Laramide time as an effect of the Yellowstone Hotspot; (3) any explanation of transverse streams must be documented by analysis of regional geological data; and (4) much of the Subsummit Peneplain is a composite of non-cyclic surfaces and therefore has no relation to the level of basin fill. Author

N85-17445 Princeton Univ., N. J.
MESOZOIC OPHIOLITIC OLISTOSTROMES AND CENOZOIC IMBRICATE THRUST FAULTING IN THE NORTHERN CALIFORNIA COAST RANGES: GEOLOGY OF THE MYSTERIOUS VALLEY AREA, NAPA COUNTY Ph.D. Thesis
Stephen Paul Phipps 1984 669 p
Avail: Univ. Microfilms Order No. DA8417437

In the Mysterious Valley map area, an area of 500 square kilometers in eastern Napa County, and in southern Lake County, the basal Great Valley sequence (GVS) is a Tithonian chaotic unit consisting of ophiolitic olistostromes, which extends along strike for 50 km, across strike for 20 km, and is up to 1 km thick. Sedimentary serpentine flows and breccias, mafic breccias and associated finer-grained clastic rocks, and blocks of extrusive greenstone, mafic breccia, chert, bedded and unbedded clastic sediments, and phyllites, actinolitic greenschists and hornblende amphibolites are mixed with GVS mudstone and serpentinous mudstone. The Coast Range Ophiolite often consists only of serpentinite, and a variety of ophiolitic debris commonly overlies it or is interbedded with the overlying GVS turbidies, suggesting that the ophiolite was deeply eroded during Mesozoic time. The map pattern in the study area consists of anastomosing thrust faults, plunging folds in relay patterns, and windows and klippen.
Dissert. Abstr.

N85-17446 Brown Univ., Providence, R. I.
LATE QUATERNARY DEEP-WATER PALEOCEANOGRAPHY OF THE EASTERN EQUATORIAL INDIAN OCEAN: EVIDENCE FROM BETHNIC FORAMINIFERA, CARBONATE DISSOLUTION, AND STABLE ISOTOPES Ph.D. Thesis
Larry Curtis Peterson 1984 438 p
Avail: Univ. Microfilms Order No. DA8422471

Carbonate preservation, benthic foraminifera, and stratigraphic variations delta C-13 of Planulina wuellerstorfi were studied in Holocene core-top samples from the eastern equatorial Indian Ocean and in a suite of piston cores from the Ninetyeast Ridge at 6 deg S. A foraminiferal-based carbonate dissolution index (CD) identifies the present level of the lysocline (3800 m) and reflects the modern carbonate saturation gradient in the water column. Carbonate saturation levels, possibly combined with the effects of selective dissolution, best explain the first-order distribution patterns of benthic foraminifera in surface sediments. Piston cores from water depths of 2900 to 4400 m provide and 800 kyr record of bathymetric and temporal change in carbonate preservation and in the benthic faunas. All results are consistent with a model suggesting a direct response of local carbonate saturation to sea level variation and changes in the organic carbon budget of the deep sea. Dissert. Abstr.

N85-17447 Illinois Univ., Urbana-Champaign.
SEDIMENTARY PETROLOGY AND PROVENANCE OF THE UPPER JACKFORTH SANDSTONE (MORROWAN) QUACHITA MOUNTAINS, ARKANSAS, USA Ph.D. Thesis
Michael Rainey Owen 1984 167 p
Avail: Univ. Microfilms Order No. DA8422790

The upper Jackfork Sandstone of the southern Ouachita Mountains in southwest Arkansas is a moderately to poorly sorted quartz arenite with only minor amounts of altered matrix or feldspar. It was deposited as a thick sequence of turbidites in a complex array of deep water submarine fans adjacent to the southern margin of the North American craton. Post-Paleozoic erosion to the north and sedimentation in the south of the Quachita Mountains have hindered efforts to determine the source area of the Jackfork. Previous workers have suggested northerly (cratonic) and southerly (South American) source regions. The objective of this study has been to determine which of these alternatives is the most plausible, and to characterize the petrology and tectonic setting of the source area. In addition to standard petrographic techniques, this study has determined the statistical distribution of cathodoluminescence colors of quartz from the Jackfork and compared it against those of coeval sandstone units from adjacent basins. Dissert. Abstr.

N85-17448 Harvard Univ., Cambridge, Mass.
DEPOSITIONAL MODELING OF TETRAHEDRITE IN THE COEUR D'ALENE DISTRICT, IDAHO Ph.D. Thesis
Claudia Jane Hackbarth 1984 302 p
Avail: Univ. Microfilms Order No. DA8419291

Data from veins in the Coeur d'Alene district in Idaho show that tetrahedrite compositions, Ag/Cu ratios, and Ag and Cu grades are distributed in an orderly fashion. The average composition of tetrahedrite in a vein changes from low to high Ag and Sb (with corresponding decreases in Cu and As) upwards and/or laterally in a vein. The Ag and Cu grades increase upward or laterally to maximum values, and then decrease again, because the abundance of tetrahedrite goes hrough a maximum. Variations in Cu-Ag and Sb-As contents are strongly correlated within each sample, but the slopes and intercepts of the correlations are different for different samples, and the average composition of the samples varies with position in the ore deposit. A model featuring fractional crystallization of tetrahedrite from hydrothermal fluids is presented to account for these observations. Author

N85-17449 Pennsylvania State Univ., University Park.
A WIND-TUNNEL STUDY OF THE SALTATION OF HETEROGENEOUS (SIZE, DENSITY) SANDS Ph.D. Thesis
Kathleen Mary Gerety 1984 189 p
Avail: Univ. Microfilms Order No. DA8419594

Results of wind-tunnel experiments designed to investigate selective sorting of sands by size (d) and density (sigma) document the composition and texture of the saltating population entrained from a source sand with non-uniform size and mineralogy. In the source sand quartz (sigma = 2.65 g/cu cm), garnet (sigma = 4.3 g/sigma cm) and olivine (sigma = 3.35 g/cu cm) had the same size range (0.08 - 0.5 mm), same mean size (0.2 mm), and similar size-frequency distributions. Therefore, sorting in experiments was not confounded by a lack of availability of coarse heavies. In four experiments, at U. values of 20,40,52 and 110 cm/sec, paired mean sizes of qaurtz and garnet in saltation are not statistically significantly different at each height from 1 to 5 cm above the bed. Shapes of size-frequency distributions near the bed ($y < 2$ cm) reflect initial distributions for both minerals. With increasing U., size distributions at $y < 2$ cm have larger bar-d and greater coarse tails. At any U. samples higher in the saltation loud ($y >$ or $= 2$ cm) have more peaked distributions with smaller bar-d smaller maximum size and insignificant coarse tails. Dissert. Abstr.

N85-17450 Rutgers - The State Univ., New Brunswick, N. J.
A 2-DIMENSIONAL SECOND ORDER CLOSURE MODEL OF THE UPPER ATMOSPHERE Ph.D. Thesis
Steven Charles Gonzales 1984 132 p
Avail: Univ. Microfilms Order No. DA8424108

A two-dimensional one layer general circulation model proposed by Tennekes (1977) was numerically studied and compared with the radiosonde data of Oort and Rasmussen (1971). The final form of the time and zonal averaged governing equations for a second order closure are solved by use of invariant modeling. The numerical algorithm employed in solving the governing

equations assumes known profiles for the first iteration step. The procedure is to separately calculate the transport of sensible heat, zonal eddy flux, and temperature variance from the known zonal momentum variance, meridional momentum variance, and eddy momentum flux, then recalculate the previously fixed atmospheric variables and continually update the two step procedure until there is no appreciable change in the six governing equations.
Dissert. Abstr.

N85-17451*# Alabama Univ., Huntsville. School of Science.
PLASMA AND MAGNETOSPHERIC RESEARCH Quarterly Progress Report, Sep. - Dec. 1984
Richard H. Comfort and James L. Horwitz Jan. 1985 13 p refs (Contract NAS8-33982)
(NASA-CR-171293; NAS 1.26:171293) Avail: NTIS HC A02/MF A01 CSCL 04A

Analysis techniques and software development; data analysis and modeling; spacecraft sheath effects; laboratory plasma flow studies; and instrument development are described. B.G.

N85-17452*# International Council of Scientific Unions, Urbana, Ill.
MIDDLE ATMOSPHERE PROGRAM. HANDBOOK FOR MAP. VOLUME 13: GROUND-BASED TECHNIQUES
R. A. Vincent, ed. (Illinois Univ., Urbana) Nov. 1984 268 p refs (Contract NASw-3805)
(NASA-CR-174345; NAS 1.26:174345; MAP-Handbook-13) Avail: NTIS HC A12/MF A01 CSCL 04A

Topics of activities in the middle Atmosphere program covered include: lidar systems of aerosol studies; mesosphere temperature; upper atmosphere temperatures and winds; D region electron densities; nitrogen oxides; atmospheric composition and structure; and optical sounding of ozone. For individual titles, see N85-17453 through N85-17468.

N85-17453*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
GROUND-BASED MEASUREMENTS OF MESOSPHERE TEMPERATURES BY OPTICAL MEANS
J. W. Meriweather, Jr. *In* International Council of Scientific Unions Middle Atmosphere Handbook, Vol. 13 Nov. 1984 p 1-18 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

The determination of the rotatinal temperature of the molecular emissions of OH or O2 offers a means of observing from the ground the mesosphere temperature at about 90 km throughout the night. The techniques and optical instrumentation developed to carry out these measurements are described. In comparison with other methods for the observation of this important geophysical quantity the optical technique is inexpensive and readily applicable for automatic operations over a long time period.
Author

N85-17454*# Adelaide Univ. (Australia). Inst. for Antarctic Research.
APPLICATION OF FABRY-PEROT SPECTROMETERS FOR MEASUREMENT OF UPPER ATMOSPHERE TEMPERATURES AND WINDS
F. Jacka *In* International Council of Scientific Unions Middle Atmosphere Handbook, Vol. 13 Nov. 1984 p 19-40 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

The mechanisms giving rise to certain airglow and auroral emissions and their height distribution are briefly surveyed. The basic principles of operation of scanning Fabry-Perot spectrometers are outlined in order to illustrate the calibration and use of such instruments to measure Doppler broadening and shift of atomic emission lines in the spectrum of the airglow and aurora and hence to infer atmospheric temperatures and wind velocities. Technical details of some specific instruments are given. Brief mention is made of the use of wide angle Michelson interferometers for the same application. Emphasis is given to the future importance of imaging Fabry-Perot spectrometers to permit the detailed mapping of temperature and wind velocity, especially in the auroral regions.
Author

N85-17455*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
OPTICAL STUDIES OF NITROGEN OXIDES IN THE STRATOSPHERE Abstract Only
J. F. Noxon *In* International Council of Scientific Unions Middle Atmosphere Handbook, Vol. 13 Nov. 1984 p 41-42 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

Several observational approaches were used to study the oxides of nitrogen in the stratosphere. Two species are accessible in the visible range: NO2 (400 to 450 nm) and NO3 (620 to 670 nm). In the infrared NO, NO2 and HNO3 can be studied easily only if measurements are made from above the tropopause where the water density becomes low. Measurements were carried out both by ground-based techniques as well as aircraft and balloons. B.G.

N85-17456*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
MICROWAVE RADIOMETRIC STUDIES OF COMPOSITION AND STRUCTURE
J. J. Olivero *In* International Council of Scientific Unions Middle Atmosphere Handbook, Vol. 13 Nov. 1984 p 43-55 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

In the past decade the use of ground-based microwave radiometry has grown as a useful measurement technique. Microwave radiometry is the precise measurement of small amounts of electromagnetic radiation at quite short wavelengths (submillimeter to centimeter). Growth in this field was carefully nutured by the radio astronomy community. Future growth was also discussed. B.G.

N85-17457*# Rome Univ. (Italy). Dipt. di Fisica.
LIDAR SYSTEMS FOR AEROSOL STUDIES: AN OUTLINE
G. Fiocco *In* International Council of Scientific Unions Middle Atmosphere Handbook, Vol. 13 Nov. 1984 p 56-68 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

An introductory survey of the problems encountered in the design and operation of a ground based lidar system and its application to atmospheric aerosol studies in the height region 10 to 100 km.
Author

N85-17458*# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Service d'Aeronomie.
ACTIVE OPTICAL SOUNDING OF OZONE AND MINOR CONSTITUENTS IN THE MIDDLE ATMOSPHERE: A REVIEW OF GROUND-BASED LIDAR MEASUREMENTS
G. Megie and J. Pelon *In* International Council of Scientific Unions Middle Atmosphere Handbook, Vol. 13 Nov. 1984 p 69-86 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

Due to the rapid development of powerful laser sources in the UV wavelength range which includes nd:yag pumped dye lasers and excimer lasers, ground-based lidar systems are now operational for ozone monitoring in the troposphere and the stratosphere. Such systems will play an important role in the determination of long term ozone trends in the photochemical region. The capacities of active lidar systems in terms of high temporal and spatial resolution and measurements continuity, allow the observation of the ozone variations at various time and space scales which are important in present day areas of interest. The already operational character of the lidar systems will constitute the basis for

development of a ground-base network for middle atmospheric observations of ozone and other race gases. B.G.

N85-17459*# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Service d'Aeronomie.
LIDAR STUDIES OF TEMPERATURE AND DENSITY USING RAYLEIGH SCATTERING
M. L. Chanin and A. Hauchecorne *In* International Council of Scientific Unions Middle Atmosphere Handbook, Vol. 13 Nov. 1984 p 87-98 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

Lidar has proved to be a necessary complement to the different tools already available to study the atmosphere either to complete the altitude range to be studied or to measure a complementary parameter. Futhermore, the high spatial resolution provides a new insight in the behavior of the middle atmosphere. However it is obvious that the results have to be used in correlation with satellite observations in order to be placed in the global context. A major contribution to the understanding of the dynamics of such instruments, mainly if they are combined with radars, ological rockets and balloons. The spacing of such a network and the geographic situation of the sites depend on the problem to be studied. Author

N85-17460*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LIDAR STUDIES OF THE ALKALI METALS
B. R. Clemesha *In* International Council of Scientific Unions Middle Atmosphere Handbook, Vol. 13 Nov. 1984 p 99-112 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

The development of the lidar technique in the early sixties, and the subsequent introduction of tunable lasers, made accurate measurements of the vertical distribution of the alkali metals in the atmosphere possible for the first time. Over the last decade a great deal of information was obtained on the spatial and temporal variations of sodium, and rather less information was obtained about potassium and lithium. The possibility of making continuous observations of the vertical distribution of sodium, coupled with temperature measurements via the determination of the Doppler spectrum of the returned lidar signal, offers a potentially useful technique for studying the dynamics of the 80 to 100 km region of the atmosphere. Author

N85-17461*# Saskatchewan Univ., Saskatoon. Inst. of Space and Atmospheric Studies.
PARTIAL REFLECTION D-REGION ELECTRON DENSITIES
A. H. Manson and C. E. Meek *In* International Council of Scientific Unions Middle Atmosphere Handbook, Vol. 13 Nov. 1984 p 113-123 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

The differential absorption technique of measuring electron densities as a function of height in the D region is discussed. In the basic experiment, pulses of medium or high frequency, usually at a fixed frequency (2 to MHz), are radiated upwards with known wave polarizatin (usually linear or circular) from a transmitter at ground level. Partial reflections, from ionospheric scatterers at heights below the E region, are received at the ground, and are resolved into two characteristic components, the ordinary (0) and extraordinary (E) modes whose amplitude ration A(x)/A(o) is then measured as a function of height, h. The heights of these are determined by delay times, the group retardation being minimal in the undisturbed D-region. The electronic system can be very simple. Power splitters and quadrature networks to separate the A(x) and A(o) components are commercially available at low prices and an A-D converter, height-gate system, and microcomputer allows the real-time calculation of mean amplitudes. The ratio of the coefficients of reflection of the two modes, as they originate at each reflection height is then calculable. M.G.

N85-17462*# Georgia Inst. of Tech., Atlanta. School of Geophysical Sciences.
MWR, METEOR WIND RADARS
R. G. Roper *In* International Council of Scientific Unions Middle Atmosphere Handbook, Vol. 13 Nov. 1984 p 124-134 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

The requirements of a state of the art meteor wind radar, and acceptable comprises in the interests of economy, are detailed. Design consideration of some existing and proposed radars are discussed. The need for international cooperation in mesopause level wind measurement, such as that being fostered by the MAP GLOBMET (Global Meteor Observations System) project, is emphasized. Author

N85-17463*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Electrical Engineering and Applied Physics.
INCOHERENT SCATTER RADAR STUDIES OF THE MESOSPHERE
J. D. Mathews *In* International Council of Scientific Unions Middle Atmosphere Handbook, Vol. 13 Nov. 1984 p 135-154 refs (For primary document see N85-17452 08-46)
(Grants NSF ATM-79-18379; NSF ATM-82-13619)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

All current incoherent backscatter radars can make mesospheric or D region measurements under at least some conditions. The conditions under which measurements are possible are derived and shown for each radar. Conditions examined include overall system sensitivity, electron and ion spectral line widths and power distributions, and time/height averaging effects. The radar equations is derived and calibrations of the radar system is discussed. Total power only and combined total power and ion line spectral measurements are described in terms of ease of use, applicability to various radars, and parameters of aerodynamic interest derivable from the measurements. Author

N85-17464*# Instituto Geofisico del Peru, Lima.
BINARY PULSE COMPRESSION TECHNIQUES FOR MST RADARS c32
R. F. Woodman, M. P. Sulzer (Arecibo Observatory, Puerto Rico), and D. T. Farley (Cornell Univ., Ithaca, N.Y.) *In* International Council of Scientific Unions Middle Atmosphere Program, Vol. 13 Nov. 1984 p 155-165 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 17I

In most mesosphere-stratosphere-troposphere (MST) applications pulsed radars are peak power limited and have excess average power capability. Short pulses are required for good range resolution but the problem of range biguity (signals received simultaneously from more than one altitude) sets a minimum limit on the interpulse period (IPP). Pulse compression is a echnique which allows more of the transmitter average power capacity to be used without scarificing range resolution. Binary phase coding methods for pulse compression are discussed. Many aspects of codes and decoding and their applications to MST experiments are addressed; this includes Barker codes and longer individual codes, and then complementary codes and other code sets. Software decoding, hardware decoders, and coherent integrators are also discussed. M.G.

N85-17465*# Adelaide Univ. (Australia). Dept. of Physics.
THE ANALYSIS OF SPACED SENSOR RECORDS BY CORRELATION TECHNIQUES c32
B. H. Briggs *In* International Council of Scientific Unions Middle Atmosphere Program, Vol. 13 Nov. 1984 p 166-186 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 17I

The use of cross correlation and autocorrelation techniques to determine drift velocity and other parameters of moving patterns

is examined. Background on the nature of moving patterns is provided. Stationary randomly-changing patterns and moving randomly-changing patterns are considered. M.G.

N85-17466*# EISCAT Scientific Association, Kiruna (Sweden).
THE MST RADAR TECHNIQUE c32
J. Roettger (Max-Planck-Inst. fuer Aeronomie) *In* International Council of Scientific Unions Middle Atmosphere Program, Vol. 13 Nov. 1984 p 187-232 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 17I

The coherent radar technique is reviewed with special emphasis to mesosphere-stratosphere-troposphere (MST) radars operating in the VHF band. Some basic introduction to Doppler radar measurements and the radar equation is followed by an outline of the characteristics of atmospheric turbulence, viewed from the scattering and reflection processes of radar signals. Radar signal acquisition and preprocessing, namely coherent detection, digital sampling, pre-integration and coding, is briefly discussed. The data analysis is represented in terms of the correlation and spectrum analysis, yielding the essential parameters: power, signal-to-noise ratio, average and fluctuating velocity and persistency. The techniques to measure wind velocities, viz. the different modes of the Doppler method as well as the space antenna method are surveyed and the feasibilities of the MST radar interferometer technique are elucidated. A general view on the criteria to design phased array antennas is given. An outline of the hardware of a typical MST radar system is presented. M.G.

N85-17467*# Canterbury Univ., Christchurch (New Zealand). Dept. of Physics.
PARTIAL REFLECTION SPACED ANTENNA WIND MEASUREMENTS
G. J. Fraser *In* International Council of Scientific Unions Middle Atmosphere Program, Vol. 13 Nov. 1984 p 233-247 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

The nature of partially reflecting (PR) irregularities is briefly reviewed and the techniques used in the PR spaced antenna method are discussed. The radars addressed use frequencies in the 2 to 6 MHz range operate in a pulse mode at vertical incidence. Radar system parameters including receiver dynamic range, coherent and incoherent detection, and post detection filtering are examined. Finally, data system parameters and real time analysis techniques are discussed. M.G.

N85-17468*# Leipzig Univ. (East Germany). Geophysics Div.
D1 LF WIND MEASUREMENTS IN THE 90 TO 100 km HEIGHT RANGE
R. Schminder and D. Kurschner *In* International Council of Scientific Unions Middle Atmosphere Program, Vol. 13 Nov. 1984 p 241-261 refs (For primary document see N85-17452 08-46)
Avail: NTIS HC A12/MF A01; also avail. from SCOSTEP Secretariat, Illinois Univ., Urbana CSCL 04A

A short historical review of the development and use of D1 low frequency (LF) techniques for wind measurement is presented and the measuring and evaluation procedures are described. The advantages and disadvantages of D1 LF measurements are examined. Finally, the results of measurements over Central Europe acquired by the Collm Geophysical Observatory are discussed. M.G.

N85-17469# Aerospace Corp., El Segundo, Calif.
AN AURORAL X-RAY IMAGING SPECTROMETER
P. F. Mizera, W. A. Kolasinski, D. J. Gorney, and J. L. Roeder 30 Sep. 1984 13 p
(Contract F04701-83-C-0084)
(AD-A147756; TR-0084(4478-32)-4; SD-TR-84-39) Avail: NTIS HC A02/MF A01 CSCL 04/1

A scanning X-ray spectrometer was flown abroad the USAF-Defense Meteorological Satellite Program (DMSP-F6) satellite to image X-ray production in the Earth's atmosphere. One of the main objectives of this experiment was to image auroral signatures associated with electron precipitation at energies above a few keV. A brief description of the instrument is given and a sequence of auroral images is shown to demonstrate on-orbit performance and to illustrate the use of such data to remotely monitor ionization density perturbations in the Earth's atmosphere. Author (GRA)

N85-17470# California Univ., Riverside. Statewide Air Pollution Research Center.
ATMOSPHERIC PHOTOCHEMICAL MODELING OF TURBINE ENGINE FUELS. PHASE 1: EXPERIMENTAL STUDIES. VOLUME 2: ENVIRONMENTAL CHAMBER DATA TABULATIONS Final Report, Jun. 1983 - Jun. 1984
W. P. L. Carter, A. M. Winer, R. Atkinson, M. C. Dodd, and W. D. Long Sep. 1984 576 p
(Contract F08635-80-C-0359)
(AD-A147786; AFESC/ESL-TR-84-32-Vol-2) Avail: NTIS HC A25/MF A01 CSCL 04/1

This report documents the results of the first phase of a two-phase program aimed at developing for the U.S. Air Force experimentally tested computer models to predict worst-case potentials for air quality degradation resulting from use of current and potential future turbine engine (jet) fuels. The development and testing of such models requires an adequate data base derived from appropriate environmental chamber experiments and laboratory studies. In Phase I of this two-phase program, a total of 131 environmental chamber experiments were carried out in a approx. 640000-liter, all Teflon indoor environmental chamber and several kinetic measurements were made in order to obtain data required for model development. The chamber experiments included 47 single component-NOx-air irradiations of various representative fuel constituents and potential future fuel impurities, 15 fuel-NOx-air irradiations of various representative fuel constituents and potential future fuel impurities, 15 fuel--NOx-air irradiations employing one whole and six synthetic surrogate fuels, and 69 control or characterization runs. Volume II contains a tabulation of the environmental chamber data gathered during the course of the experimental phase of this program. GRA

N85-17471# Photometrics, Inc., Woburn, Mass.
ATMOSPHERIC WIND AND DIFFUSION FROM ANALYSIS OF AN SF6 RELEASE AT 350 KM ALTITUDE Final Report, 19 Dec. 1983 - 31 Jul. 1984
C. A. Trowbridge 31 Jul. 1984 36 p
(Contract F19628-84-C-0004)
(AD-A147965; PHM-TR-84-04; AFGL-TR-84-0200) Avail: NTIS HC A03/MF A01 CSCL 04/1

Analysis of intensified video imagery of the nighttime release of sulfur hefafluoride at 350 km altitude has provided the first measurements of atmospheric diffusion and wind velocity at high altitude. The measurements apply to validating models of atmospheric dynamics and of the reactions and transport of the released species. Images taken through a wide angle lens system with OI 7774 and 6300 A narrow band pass filters at its telecentric stop were digitized to determine the image plane locations of stars and spatial distribution of the release-induced glow. Photogrammetric procedures were applied to determine orientation of the airborne camera from the image positions of the known bright stars. Single-site triangulation was performed to locate the glow center in a time sequence of images, from which the atmospheric wind components were determined. The distribution of glow irradiance recorded in the images were analyzed to determine time dependent spatial halfwidths of the cloud, from which its diffusive growth was determined. GRA

N85-17472# Alaska Univ., Fairbanks. Dept. of Space Physics and Atmospheric Science.
SUN-ALIGNED POLAR CAP AURORAL ARCS Final Report, 1 Nov. 1981 - 30 Sep. 1984
Joseph R. Kan 5 Oct. 1984 24 p
(Contract F19628-82-K-0010)
(AD-A148052; AFGL-TR-84-0254) Avail: NTIS HC A02/MF A01

CSCL 04/1

A model of polar cap auroral arcs is proposed under the assumption that the magnetic field reconnection occurs in the cusp region on tail field lines during northward interplanetary magnetic field (IMF) conditions. Requirements of a convection model during northward IMF are enumerated based on observations and fundamental theoretical considerations. The theta aurora can be expected to occur on the closed field lines convecting sunward in the central polar cap while the less intense polar cap arcs can occur either on closed or open field lines. The dynamo region for the polar cap arcs is required to be on closed field lines convecting tailward in the plasma sheet which is magnetically connected to the sunward convection in the central polar cap. Author (GRA)

N85-17473# Regis Coll., Weston, Mass.
ARTIFICIAL IONOSPHERIC DISTURBANCES CAUSED BY POWERFUL RADIO WAVES
M. C. Lee and S. P. Kuo (Polytechnic Inst. of New York, Farmingdale) 19 Nov. 1984 8 p Presented at the Ionospheric Effect Symp., Alexandria, Va., 1-3 May 1984
(Contract F19628-83-K-0024; Grants AF-AFOSR-0001-83; NSF ATM-83-15322)
(AD-A148077; AFGL-TR-84-0297) Avail: NTIS HC A02/MF A01 CSCL 04/1

Artificial ionospheric disturbances evidenced as fluctuations in plasma density and geomagnetic field can be caused by powerful radio waves with a broad frequency band ranging from a few KHz to several GHz. The filamentation instability of radio waves with a broad frequency band ranging from a few KHz to several GHz can produce both large-scale plasma density fluctuations and large-scale geomagnetic field fluctuations simultaneously. The excitation of this instability is examined in the VLF wave injection experiments, the envisioned MF ionospheric heating experiments, the HF ionospheric heating experiments and the conceptualized Solar Power Satellite project. Significant geomagnetic field fluctuations with magnitudes even comparable to those observed in magnetospheric (sub)systems can be excited in all of the cases investigated. Particle precipitation and airglow enhancement are expected to be the concomitant ionospheric effects associated with the wave-induced geomagnetic field fluctuations. GRA

N85-17474# Range Commanders Council, White Sands Missile Range, N. Mex. Meteorology Group.
GUIDELINES FOR ATMOSPHERIC MEASUREMENTS IN SUPPORT OF ELECTRO-OPTICAL SYSTEMS TESTING
Oct. 1984 35 p
(AD-A148090; RCC/MG-356-84) Avail: NTIS HC A03/MF A01 CSCL 04/1

The recommendations made by eight workshop panels organized to determine specifications for atmospheric measurements are outlined and working sessions are summarized. Measurement guidelines for meteorological parameters, gaseous and aerosol constituents, and transmission parameters are given. M.G.

N85-17475# Regis Coll., Weston, Mass.
IONOSPHERIC AND MAGNETOSPHERIC MODIFICATIONS CAUSED BY VLF WAVES
M. C. Lee and S. P. Kuo (Polytechnic Inst. of New York, Farmingdale) 1 Jun. 1984 5 p Presented at Proceedings of International Conference, Plasma Physics, Lausanne, Switzerland, 27 Jun. - 3 Jul. 84.
(Contract F19628-83-K-0024; Grants AF-AFOSR-0001-83; NSF ATM-83-15322; AF Proj. 4643)
(AD-A148210; AFGL-TR-84-0301) Avail: NTIS HC A02/MF A01 CSCL 04/1

The ionosphere and the magnetosphere may be significantly modified by the injected VLF waves via the thermal filamentation instability and the excitation of lower hybrid waves. In VLF wave injection experiments performed, for example, at Siple, Antarctica, the ground based transmitters are usually operated in a pulsed-wave mode with durations of a few seconds. These VLF wave pulses were used to study coherent wave-particle interactions in the magnetosphere such as the wave amplification, the triggering of wave emissions, the induced particle precipitation etc. (see e.g., Helliwell, 1983). We show in this paper that if the transmitters are operated continuously for a few minutes, significant ionospheric and magnetospheric disturbances can be caused by the following two processes. One is the thermal filamentation of the pump wave and the other one is the excitation of lower hybrid waves. GRA

N85-17476# Massachusetts Inst. of Tech., Cambridge. Earth Resources Lab.
EFFECTS OF HETEROGENEITIES ON THE PROPAGATION, SCATTERING AND ATTENUATION OF SEISMIC WAVES AND THE CHARACTERIZATION OF SEISMIC SOURCE Semiannual Report, 2 Jan. - 30 Jun. 1984
K. Aki, V. F. Cormier, and M. N. Toksoz 30 Jun. 1984 106 p
(Contract F49620-83-C-0038; ARPA Order 4397)
(AD-A148284; AFOSR-84-1023TR) Avail: NTIS HC A06/MF A01 CSCL 08/11

This study has examined the attenuation of local/regional S-codas from 0.25 Hz to Hz in the Hindu Kush region. A goal study was to separate the relative contribution of scattering versus intrinsic anelasticity to the attenuation of coda waves. Coda attenuation was analyzed in the frequency domain using a radiative transfer equation technique, which includes multiple scattering, and in the time domain using weak and strong scattering approximations. GRA

N85-17477# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
X RAYS FROM THE AURORA
P. F. Mizera and D. J. Gorney 30 Sep. 1984 21 p
(Contract F04701-83-C-0084)
(AD-A148628; TR-0084(4478-32)-3; SD-TR-84-40) Avail: NTIS HC A02/MF A01 CSCL 03/2

Data from the X-ray instrument flown aboard the the polar orbiting DMSP-F2 satellite are used to calculate electron distributions as inputs to energy deposition, electron density, and ionospheric conductivity computer codes. The calculated electron distributions are compared with those measured by the J-package instrument also aboard the satellite. A dawn-to-dusk auroral crossing during January 31, 1978 is used to provide the data from which the ionospheric parameters are calculated. The agreement between the two data sets is excellent and suggests that bremsstrahlung X-rays can be used to remotely monitor ionospheric perturbations. GRA

N85-17478# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
SPECTRAL MODELING OF A POTENTIAL VORTICITY EQUATION FOR A BAROTROPIC FLOW ON A BETA-PLANE
H. E. deSwart Apr. 1984 28 p refs
(CWI-AM-R8408; B8471265) Avail: NTIS HC A03/MF A01

A quasi-geostrophic potential vorticity equation, including forcing and dissipation mechanisms, is derived for a barotropic flow over a large scale topography on a Beta plane. The model is assumed to describe large scale motions in the atmosphere. A spectral model is constructed from the vorticity equation. Author (ESA)

N85-17226*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
GEOLOGICAL, STRUCTURAL, AND GEOMORPHOLOGICAL ANALYSES FROM SIR-B
J. W. Head, III, P. J. Mouginis-Mark (Hawaii Univ., Honolulu), S. H. Zisk (Haystack Observatory, Westford, Mass.), R. A. F. Grieve, A. R. Peterfreund, and K. D. Sullivan *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 6 p refs Prepared in cooperation with Brown Univ., Providence, R.I. (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08G

N85-17204# Joint Publications Research Service, Arlington, Va.
POLAR RESEARCH IN EARTH SCIENCES DESCRIBED
Krzysztof Birkenmajer *In its* East Europe Rept.: Sci. and Technol.

(JPRS-ESA-84-043) 3 Dec. 1984 p 28-45 refs Transl. into ENGLISH from Nauka Polska (Warsaw), no. 3, May - Jun. 1984 p 33-46 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

N85-17229*# Commonwealth Scientific and Industrial Research Organization, Wembley (Australia).
EVALUATION OF SIR-B IMAGERY FOR GEOLOGIC AND GEOMORPHIC MAPPING, HYDROLOGY, AND OCEANOGRAPHY IN AUSTRALIA
F. R. Honey, C. J. Simpson (Bureau of Mineral Resources, Canberra, Australia), J. Huntington, R. Horwitz, G. Byrne, and C. Nilsson *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 17G

N85-17232*# Arkansas Univ., Fayetteville.
EVALUATION OF THE L-BAND SCATTERING CHARACTERISTICS OF VOLCANIC TERRAIN IN AID OF LITHOLOGIC IDENTIFICATION, ASSESSMENT OF SIR-B CALIBRATION, AND DEVELOPMENT OF PLANETARY GEOMORPHIC ANALOGS
V. H. Kaupp, W. P. Waite, H. C. MacDonald, P. J. Mouginis-Mark (Hawaii Univ., Honolulu), and S. H. Zisk (Haystack Observatory, Westford, Mass.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08K

N85-17236*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
STRUCTURAL INVESTIGATION OF THE CANADIAN SHIELD BY ORBITAL RADAR AND LANDSAT
P. D. Lowman, Jr., H. W. Blodget, W. J. Webster, Jr., S. Paia (Ontario Centre for Remote Sensing), V. H. Singhroy (Ontario Centre for Remote Sensing), and V. R. Slaney (RADARSAT Project Office) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08G

N85-17247*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AN INVESTIGATION OF IONOSPHERIC IRREGULARITY EFFECTS ON SIR-B IMAGE PROCESSING AND INFORMATION EXTRACTION
E. P. Szuszczewicz (Naval Research Lab., Washington, D.C.), M. A. Abdu (Inst. de Pesquisas Espaciais, Sao Paulo, Brazil), J. H. A. Sobral (Inst. de Pesquisas Espaciais, Sao Paulo, Brazil), J. Jost, B. M. Reddy (National Physical Lab., New Delhi, India), C. Rino (Stanford Research Inst., Menlo Park, Calif.), T. Robinson (Leicester Univ.), P. Rodrigues (Naval Research Lab., Washington, D.C.), M. Singh (Sachs/Freeman Associates, Inc., Bowie, Md.), and R. Woodman (Inst. Geofisico del Peru, Lima) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 04A

N85-17249*# Massachusetts Inst. of Tech., Cambridge.
DELINEATION OF MAJOR GEOLOGIC STRUCTURES IN TURKEY USING SIR-B DATA
M. N. Toksoz, G. H. Pettengill, P. Ford, and L. Gulen *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08G

N85-17383# National Research Inst., Bankura (India).
ON SEISMIC WAVES
Sasadhar De *In* Shock and Vibration Information Center The Shock and Vibration Digest, V. 16, No. 11 Nov. 1984 p 3-24 refs (For primary document see N85-17382 08-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 08/11

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N85-17479*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SATELLITE STRATOSPHERIC AEROSOL MEASUREMENT VALIDATION
P. B. Russell and M. P. McCormick (NASA. Langley Research Center) Aug. 1984 10 p refs
(NASA-TM-86003; A-9847; NAS 1.15:86003) Avail: NTIS HC A02/MF A01 CSCL 04B

The validity of the stratospheric aerosol measurements made by the satellite sensors SAM II and SAGE was tested by comparing their results with each other and with results obtained by other techniques (lider, dustsonde, filter, and impactor). The latter type of comparison required the development of special techniques that convert the quantity measured by the correlative sensor (e.g. particle backscatter, number, or mass) to that measured by the satellite sensor (extinction) and quantitatively estimate the uncertainty in the conversion process. The results of both types of comparisons show agreement within the measurement and conversion uncertainties. Moreover, the satellite uncertainty is small compared to aerosol natural variability (caused by seasonal changes, volcanoes, sudden warmings, and vortex structure). It was concluded that the satellite measurements are valid. Author

N85-17480*# Colorado State Univ., Fort Collins.
SEA BREEZE-INDUCED MESOSCALE SYSTEMS AND SEVERE WEATHER Progress Report
Roger A. Pielke Jan. 1985 10 p refs
(Grant NAG5-359)
(NASA-CR-174317; NAS 1.26:174317) Avail: NTIS HC A02/MF A01 CSCL 04B

The relationship between thunderstorm activity during the summer months along coastal regions of the Atlantic and Gulf coasts and the dry sea breeze circulation was investigated. Satellite composites of thunderstorm activity for synoptically undisturbed conditions have been obtained for south Florida for a series of days in the summer of 1983. These data were catalogued into different low level synoptic flow regimes. Five synoptic flow regimes were found from the data. A three-dimensional mesoscale numerical model was used for each sysnoptic flow regime to quantitatively predict the location of enhanced thunderstorm activity. This model includes a parameterization of vegetation and soil moisture feedbacks as well as a sophisticated planetary boundary layer representation. Using the results of the satellite image composites, spatial and temporal characteristics of deep convective cloud patterns and their variation with synoptic flow are described. The results from the numerical model have provided explanations for the observed patterns. B.W.

N85-17481*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PILOT CLIMATE DATA SYSTEM
[1985] 16 p Original contains color illustrations
(NASA-CR-174321; NAS 1.26:174321) Avail: NTIS HC A02/MF A01 CSCL 04B

A usable data base, the Pilot climate Data System (PCDS) is described. The PCDS is designed to be an interactive, easy-to-use, on-line generalized scientific information system. It efficiently provides uniform data catalogs; inventories, and access method, as well as manipulation and display tools for a large assortment of Earth, ocean and atmospheric data for the climate-related research community. Researchers can employ the PCDS to scan, manipulate, compare, display, and study climate parameters from diverse data sets. Software features, and applications of the PCDS are highlighted. B.W.

N85-17482*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MATHEMATICAL PHYSICS APPROACHES TO LIGHTNING DISCHARGE PROBLEMS

Ali Kyrala Jan. 1985 44 p
(NASA-TM-86349; NAS 1.15:86349) Avail: NTIS HC A03/MF A01 CSCL 04B

Mathematical physics arguments useful for lightning discharge and generation problems are pursued. A soliton Ansatz for the lightning stroke is treated including a charge generation term which is the ultimate source for the phenomena. Equations are established for a partially ionized plasma inding the effects of pressure, magnetic field, electric field, gravitation, viscosity, and temperature. From these equations is then derived the non-stationary generalized Ohm's Law essential for describing field/current density relationships in the horizon channel of the lightning stroke. The discharge initiation problem is discussed. It is argued that the ionization rate drives both the convective current and electric displacement current to increase exponentially. The statistical distributions of charge in the thundercloud preceding a lightning dischage are considered. The stability of the pre-lightning charge distributions and the use of Boltzmann relaxational equations to determine them are discussed along with a covered impedance path provided by the aircraft. R.S.F.

N85-17483# Naval Postgraduate School, Monterey, Calif.
ESTIMATIONS OF DIABATIC HEATING FOR AN EXPLOSIVELY-DEVELOPING MARITIME CYCLONE M.S. Thesis
T. E. Bosse Jun. 1984 159 p
(AD-A147678) Avail: NTIS HC A08/MF A01 CSCL 04/2

This thesis evaluates the Navy operational global atmospheric prediction system (NOGAPS) boundary layer and cloud parameterizations for a case of explosive cyclogenesis in the western North Pacific Ocean. Storm region diabatic heating estimates are obtained from the application of quasi-Lagrangian diagnostics to a thermodynamic energy budget calculation, and from the NOGAPS diagnoses. The model diagnosed sensible heating appears to be correctly positioned, while the diagnoses of convective, large scale and open cell cumulus condensation heating produce cloud features which generally reflect the distribution of the clouds in the satellite imagery. The NOGAPS provides a better estimate of the diabatic heating over the open ocean than does the thermodynamic energy budget calculation. The contribution of diabatic heating in this case study is determined to be as significant as that of thermal advection. This diabatic energy input is an order of magnetic greater than that determined from studies of continental cyclogenesis. GRA

N85-17484# Boston Coll., Chesnut Hill, Mass. Space Data Analysis Lab.
DATA ANALYSIS TECHNIQUES FOR VEHICLE ATTITUDINAL, POSITIONAL AND EXPERIMENTAL MEASUREMENTS Final Report, 1 Apr. 1981 - 31 Mar 1984
B. F. Sullivan, N. J. Grossbard, and M. E. Stick Hanscom AFB, Mass. AFGL 30 Apr. 1984 83 p
(Contract F19628-81-C-0095)
(AD-A147752; BC-SDAL-84-1; AFGL-TR-84-0147) Avail: NTIS HC A05/MF A01 CSCL 04/2

Time related data analysis techniques applied to the TEM-3 Rocket and Talos-Castor Rocket A51.971 are discussed in the reduction of gyro and positional information. Procedures developed to calculate wind velocities and shears for balloon interferometer and radiometer measurements of Balloon Altitude Mosaic Measurements Flight III data are outlined. Altitude dependent analysis procedures to calculate the electron and particle distribution functions in the ionosphere are presented, and results of a spectral analysis study of stratospheric wind data are shown. Author (GRA)

N85-17485# National Climatic Center, Asheville, N. C.
WIND AND WAVE SUMMARIES FOR SELECTED US COAST GUARD OPERATING AREAS: ADDENDUM
D. Paskausky, J. D. Elms, R. G. Baldwin, P. L. Franks, and C. N. Williams, Jr. May 1984 536 p
(Contract DTCG23-83-F-20073)
(AD-A147957; USCG-D-05-84; CGR/DC-14/84) Avail: NTIS HC A23/MF A01 CSCL 04/2

This report was prepared to describe wind and wave conditions that can be expected in U.S. Coast Guard geographical operating areas. The intent is to provide operational program managers a tool to use when considering the potential applications to conventional and advanced marine vehicles (AMVs) to Coast Guard missions. It is also intended to supplement research determining the feasibility of alternate energy sources that involve wind or waves. This work was performed by the National Climatic Data Center under the direction of the U.S. Coast Guard Research and Development Center for the Office of Research and Development. GRA

N85-17486# Air Force Geophysics Lab., Hanscom AFB, Mass.
TWO-DIMENSIONAL MODELING FOR LINEAL AND AREAL PROBABILITIES OF WEATHER CONDITIONS
C. F. Burger and I. I. Gringorten 10 Apr. 1984 56 p
(AD-A147970; AFGL-TR-84-0126; AFGL-ERP-875) Avail: NTIS HC A04/MF A01 CSCL 04/2

Single-point probabilities of weather conditions, which are easily estimated from climatic records, have been extended to lines and areas by means of Monte Carlo simulation. Simulation was accomplished using the Boehm Sawtooth Wave (BSW) model. This model was chosen because of its speed and simplicity, and because it has a spatial correlation function similar to that of many weather elements. The BSW model generates fields (or maps) of normally distributed values called Equivalent Normal Deviates (ENDs). The procedure was to obtain the cumulative probability distribution for threshold END values. To do this, a large number of maps had to be generated, 25,000 in all, to approximate the true probability distributions. This was done for 12 different sized square areas and lines. The results were put in graphical form by plotting the probabilities as a function of areal and lineal size, and fitting them to curves through hand analysis. The curves were then fitted by equations, making it possible to obtain solutions quickly by computer. Thus, a model has been produced that can be used to estimate the probability that a certain weather condition will cover a given area or length, or fraction of an area or length. GRA

N85-17487# Pennsylvania State Univ., University Park. Dept. of Meteorology.
A SCHEME FOR SHORT-TERM PREDICTION OF HYDROMETEORS USING ADVECTION AND PHYSICAL FORCING Final Report, Feb. 1982 - Jul. 1984
G. S. Forbes, J. J. Cahir, W. D. Lottes, E. Araujo, and P. O. G. Heppner Jul. 1984 118 p
(Contract F19628-82-K-0023)
(AD-A148011; AFGL-TR-84-0199) Avail: NTIS HC A06/MF A01 CSCL 04/2

We have developed a number of schemes which show skills varying from modest to impressive, depending upon the weather regime. These schemes are interactive, and their successful implementation requires a man-machine mix. The approaches taken in this research project have primarily focused upon the developmental or evolving, i.e. non-steady-state aspects of the problem of short-term forecasting of cloudiness and precipitation. Most of our schemes have incorporated a translational contribution either explicitly or implicitly, however. The approaches taken in this research project have addressed the problem of cloudiness and precipitation forecasting on meso-alpha and larger scales. The approaches, by virtue of treating the developmental aspects of the short-term forecasting problem, have inherently bypassed the problem of persistence or persistence climatology being such a hard forecast to beat. GRA

N85-17488# Utah Univ., Salt Lake City. Dept. of Meteorology.
RADIATION PARAMETERIZATION PROGRAMS FOR USE IN GENERAL CIRCULATION MODELS Final Report, 1 Feb. 1983 - 31 Jul. 1984
K. N. Liou, S. C. Ou, S. Kinne, and G. Koenig 15 Aug. 1984 59 p
(Contract F19628-83-K-0015)
(AD-A148015; AFGL-TR-84-0217) Avail: NTIS HC A04/MF A01 CSCL 04/2

Parameterization programs involving infrared and solar radiation

transfer in clear and cloudy atmospheres containing high and low cloud systems are described in this report. We document in detail the physical concepts and basic parameterization equations used for the computation of infrared and solar fluxes in clear and cloudy atmospheres along with the verification of various parametrization programs. In addition, we illustrate some preliminary results of the global distributions of the cloud and radiation budget generated from the AFGL model with the incorporation of the present radiation-cloud parameterization programs. Finally, we provide a description of the radiation parameterization computer programs including the programming interface with the AFGL six-layer general circulation model. Author (GRA)

N85-17489# Air Force Geophysics Lab., Hanscom AFB, Mass.
THERMOSONDE C2N MEASUREMENTS IN HAWAII--AUGUST 1982
J. H. Brown and R. E. Good 24 Feb. 1984 40 p
(AD-A148016; AFGL-TR-84-0110; AFGL-ERP-877) Avail: NTIS HC A03/MF A01 CSCL 04/2

Eight AFGL thermosondes were flown from Mt. Haleakala, Hawaii to measure atmospheric turbulence in the form of the optical refractive index structure constant C sub n squared. Temperature and relative humidity comparisons between the AFGL instruments and standard GMD rawinsondes are presented. The AFGL instruments obtain greater temperature and humidity spatial resolution and consequently show finer structure in the profiles. A diurnal shift in the C sub n squared profile is noted as well as a tropopause enhancement. Coherence scales are calculated from the thermosonde data. Author (GRA)

N85-17490# Weather Wing (5th), Langley AFB, Va. Climatology Branch.
COMPUTING WORLDWIDE SUNRISE, SUNSET, MOONRISE, MOONSET AND TWILIGHT TIMES USING 5 WWPS 105-3 AND 105-4 Final Report
Kenneth W. Hertzler Jul. 1984 8 p
(AD-A148049; AD-E850735; Rept-5WW/TN-84/001) Avail: NTIS HC A02/MF A01 CSCL 04/2

This technical note describes a technique which permits calculation of times of sunrise, sunset, moonrise, moonset, and the twilights. The technique requires the use of 5WW Pamphlets 105-3 and 105-4 as a data source. GRA

N85-17491# Air Weather Service, Scott AFB, Ill.
INDEX OF AIR WEATHER SERVICE TECHNICAL PUBLICATIONS, 1 JULY 1983-30 JUNE 1984
1 Jul. 1984 146 p Supersedes AWS-TI-83-001, AD-A139 133 (AD-A148051; AD-E850736; AWS/TI-84/001; AWS-TI-83-001) Avail: NTIS HC A07/MF A01 CSCL 04/2

This index lists technical publications of the US Air Force Air Weather Service including its subordinate units. These units include the Air Force Global Weather Central, US Air Force Environmental Technical Applications Center, 1st Weather Wing, 2nd Weather Wing, 3rd Weather Wing, 5th Weather Wing, and 7th Weather Wing. GRA

N85-17492# Naval Postgraduate School, Monterey, Calif.
THE VISIBILITY CLIMATOLOGY OF MCMURDO SOUND-WILLIAMS FIELD, ANTARCTICA M.S. Thesis
C. G. Souders Mar. 1984 151 p
(AD-A148108) Avail: NTIS HC A08/MF A01 CSCL 04/2

Accurate forecasting of visibility at McMurdo/Williams Field, Antarctica is essential for the air operations involving the resupply of United States bases and the conduct of research on the Antarctic continent. McMurdo, located at 77 deg 51' S 155 deg 40' E, receives all supplies destined for use by the United States Antarctic Research Program scientists. The Williams Field skiway and the adjacent ice runway are approximately 4.5 mi southeast of McMurdo. Weather observations are taken at both McMurdo and the operational airfield. The visibility climatology, August through March, for McMurdo (1956-1983) and Williams Field skiway/runway (1968-1983) was prepared using four operational visibility categories, as well as the seven important weather parameters which reduce visibility, namely, blowing snow, light snow, moderate to heavy snow, the three types of fog and ice crystals. A wind speed/direction climatology was also prepared because of its relation to both blowing snow and fog. GRA

N85-17493# Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN AUTOMATIC WEATHER STATION NETWORK FOR LOW-ALTITUDE WIND SHEAR INVESTIGATIONS
M. M. Wolfson, J. T. DiStefano, and D. L. Klingle 18 Sep. 1984 67 p
(Contracts F19628-80-C-0002; DTFA01-80-Y-10546)
(AD-A148139; ATC-128; DOT/FAA/PM-84/13) Avail: NTIS HC A04/MF A01 CSCL 04/2

During the summer of 1983 an experimental network of automatic weather stations (a mesonet) was operated in the vicinity of Hanscom Field, northwest of Boston, as part of a larger effort to collect Doppler radar and meteorological data on thunderstorms and other potentially hazardous weather events in this area. This report describes the mesonet system used and presents in detail the data collected on 21-22 July 1983. Conclusions about the limitations and the future use of the mesonet system are also included. Author (GRA)

N85-17494# New Mexico Inst. of Mining and Technology, Socorro.
A STUDY OF THE EFFECTS OF TRIGGERED LIGHTNING Final Report, 15 May 1982 - 31 Dec. 1983
C. B. Moore and C. R. Holmes Oct. 1984 40 p
(Grant AF-AFOSR-0206-82)
(AD-A148296; AFOSR-84-1024TR) Avail: NTIS HC A03/MF A01 CSCL 04/1

The characteristics of lightning, artificially induced by wire-trailing rockets were measured in a cooperative program involving investigators from France, from the Flight Hazards Branch of Wright-Patterson Air Force Base and from New Mexico Institute of Mining & Technology. Lightning currents ranging from a few hundred amperes to a peak of 79 kA were measured. The waveforms of the electromagnetic signals produced by the lightning had associated magnetic field variations in excess of 10 T/s with rise times ranging from 40 ns to 1 microsecond. The development of an 11 cm radar was completed for a determination of the interaction between lightning and the surrounding atmosphere. Preliminary data on lightning echoes have now been obtained with it. GRA

N85-17495# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
CLIMATE AT CRREL (COLD REGIONS RESEARCH AND ENGINEERING LABORATORY) HANOVER, NEW HAMPSHIRE
R. E. Bates Aug. 1984 83 p
(DA Proj. 4A7-62730-AT-42)
(AD-A148400; CRREL-SR-84-24) Avail: NTIS HC A05/MF A01 CSCL 04/2

A 10-year climatological record of meteorological data collected at the CRREL meteorological station is presented for the period October 1972 through December 1982. Data presented include air temperature, heating and freezing degree-days, relative humidity, dew point, precipitation, snowfall, wind speed and direction, solar radiation and evaporation. Air temperature and precipitation monthly and annually are compared statistically to the 30-year normal and the period-of-record normal for Hanover, New Hampshire. The appendix gives daily and monthly values for the entire period of record. Some comparisons are made between the 10-year averages and the long-term normals. GRA

N85-17496# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
REGIONAL AND SEASONAL VARIATIONS IN SNOW-COVER DENSITY IN THE USSR
M. A. Bilello Aug. 1984 79 p
(DA Proj. 4A7-62730-AT-42)
(AD-A148429; CRREL-84-22) Avail: NTIS HC A05/MF A01 CSCL 08/12

Regional seasonal variations in snow-cover density (SCD) in

the U.S.S.R. were determined through the analysis of data obtained from all available Soviet literature. A relationship found between observed winter wind speeds and SCD values recorded from November through March made it possible to develop a snow-density map of the U.S.S.R. The map was divided into five general categories of SCD, ranging from values of < or = 0.21 g/cu cm at interior stations with very light winds to values of > or = 0.31 g/cu cm at arctic locations with strong winds. Since this literature survey indicated that the reported Soviet SCD values were incorrect due to instrumental errors, adjustments to the data in this study were required. Month-to-month investigation of the SCD data revealed a gradual increase in density from November to March and that the SCD values under forest canopies averaged from 4 to 14% lower than those recorded in open areas. Also included in this report are (1) a compilation of pertinent passages in the Soviet literature on SCD, (2) a map showing the location of SCD measurements, and (3) an average winter wind speed chart for the U.S.S.R. GRA

N85-17497# Research Inst. of National Defence, Linkoeping (Sweden).
THE RADIATION TEMPERATURE OF A CLOUD OF PARTICLES
Lars Falk Aug. 1984 37 p refs
(FOA-C-30367-E4; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

The radiation temperature of a cloud of particles under single scattering conditions was calculated. A particularly simple solution is possible for a cloud of randomly oriented particles when the incident radiation is emitted by a uniformly cold sky and a warm ground. Author (ESA)

N85-17498# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Chemie 3: Atmosphaerische Chemie.
ON THE IMPORTANCE OF LIGHT HYDROCARBONS IN MULTIPHASE ATMOSPHERIC SYSTEMS
D. H. Ehhalt and J. Rudolph Jul. 1984 47 p refs
(JUEL-1942; ISSN-0366-0885) Avail: NTIS HC A03/MF A01

The role of organic molecules in multiphase atmospheric systems is illustrated by the role of an organic surface film on aerosol particles and of in-cloud chemistry in the formation of HCOOH and CH3COOH from light alkanes. Vertical and meridional distributions of C2 to C5 hydrocarbons which underline their importance at the midlatitudes of the Northern Hemisphere are presented. Global emissions of individual light nonmethane hydrocarbons are quantified, and sources of C2 - C5 hydrocarbons are discussed. Author (ESA)

N85-17499# Royal Netherlands Meteorological Inst., De Bilt. Dynamische Meteorologie.
DEVELOPMENT OF GUIDANCE FORECASTS AT THE ROYAL NETHERLANDS METOROLOGICAL INSTITUTE (KNMI). PART 1: GENERAL INFORMATION
C. Lemcke and S. Kruizinga 1984 30 p refs 2 Vol.
(KNMI-TR-54-Pt-1; B8474164-Pt-1) Avail: NTIS HC A03/MF A01

Objective interpretation and translation of synoptic scale numerical weather forecasts to local weather forecasts are reviewed. Schemes focused on local weather forecasting for lead times ranging from 48 hr upwards are considered. Data sets and commonly used predictors are described. Scoring rules are discussed. Author (ESA)

N85-17500# Royal Netherlands Meteorological Inst., De Bilt. Dynamische Meteorologie.
DEVELOPMENT OF GUIDANCE FORECASTS AT THE ROYAL NETHERLANDS METEOROLOGICAL INSTITUTE (KNMI). PART 2: EXTREME WIND SPEED AT IJMUIDEN
C. Lemcke 1984 24 p refs 2 Vol.
(KNMI-TR-54-Pt-2; B8474164-Pt-2) Avail: NTIS HC A02/MF A01

Wind speeds at a platform 1500 m offshore in the North Sea were predicted using the Perfect Prog (PP) and Model Output Statistics (MOS) methods. The maximum wind speed within a 12 hr period can be predicted both as point value and as probability forecast with positive results up to H+144 inclusive. The MOS method is better than the PP method. Information obtained from the analog method improves the interpretation marginally but can be useful by stabilizing the forecasts equations. Author (ESA)

N85-17223*# Earth Satellite Corp., Chevy Chase, Md.
EVALUATION OF SIR-B DATA FOR IDENTIFYING RAINFALL EVENT OCCURRENCE AND INTENSITY
D. Garofalo, J. N. Cooper, J. R. Everett, L. J. Warnick, L. H. Wynn, C. Sheffield, M. Ruth, R. Perrine, and K. Estep *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 2 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 04B

N85-17238*# Kansas Univ. Center for Research, Inc., Lawrence.
STUDIES OF COASTAL MESOSCALE WINDS USING SIR-B
R. K. Moore and W. J. Pierson (City Univ. of New York) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 04B

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N85-17501# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
SHORE ICE RIDE-UP AND PILE-UP FEATURES. PART 2. ALASKA'S BEAUFORT SEA COAST, 1983 - 1984
A. Kovacs Sep. 1984 37 p
(AD-A148428; CRREL-84-26-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 08/12

Observations of shore ice pile-up and ride-up along the Alaska Beaufort Sea coast in 1983 and 1984 are presented. New information on historical accounts of onshore ice movement, uncovered since publication of Part I in this series, is reported. An account is given of ice overtopping a concrete caisson exploration island in the Canadian Beaufort Sea. Part I covered the winters of 1979-80, 1980-81 and 1981-82. Part II presents observations made in early May and late July 1983 and mid-May 1984. GRA

N85-17502# SACLANT ASW Research Center, La Spezia (Italy).
AN EFFICIENT NUMERICAL SOLUTION TECHNIQUE FOR WAVE PROPAGATION IN HORIZONTALLY STRATIFIED OCEAN ENVIRONMENTS
Henrik Schmidt and Finn B. Jensen 1 Aug. 1984 33 p
(AD-A148537; SACLANTCEN-SM-173) Avail: NTIS HC A03/MF A01 CSCL 12/1

This NATO-furnished report presents an efficient numerical solution technique for general applications to wave propagation in horizontally stratified viscoelastic media. The model provides a full-wave solution for the field generated by a single source as well as for that generated by a vertical source array. It allows the spatial distribution of the acoustic field to be evaluated at least one order of magnitude faster than with existing models based on the Thomson-Haskell solution technique. The computational examples clearly demonstrate the model's versatility in providing exact solutions to a wide range of guided and non-guided propagation problems in underwater acoustics, but the model is equally applicable to problems in ultrasonics and seismics. Moreover, the computational efficiency of the numerical code has made it feasible (on array processors) to perform pulse calculations based on Fourier synthesis of time signals, even when hundreds of frequency samples are needed. GRA

N85-17503# Naval Postgraduate School, Monterey, Calif.
BIBLIOGRAPHY UPDATE ON THE CALIFORNIA CURRENT SYSTEM AND RELATED MESOSCALE OCEAN MODELING
M. L. Batteen Oct. 1984 61 p
(AD-A148546; NPS68-84-017) Avail: NTIS HC A04/MF A01 CSCL 05/2

This bibliography has been prepared for use in the Ocean Prediction Through Observation, Modeling and Analysis (OPTOMA) program. It updates the 1980 publication: Bibliography for the Coastal Circulation of the Eastern North Pacific. In addition, mesoscale ocean modeling references related to the California Current System have been included. GRA

N85-17504# SACLANT ASW Research Center, La Spezia (Italy).
DEEP WATER MASS CIRCULATION IN THE WESTERN ALBORAN BASIN: MEASUREMENTS IN JULY AND SEPTEMBER 1980 (ALBORAN I EXPERIMENT)
Pavel Pistek 15 Jul. 1984 40 p
(AD-A148566; SACLANTCEN-SR-81) Avail: NTIS HC A03/MF A01 CSCL 08/3

The deep circulation of the Alboran Sea has been studied in a set of experiments. Two currentmeter moorings were deployed in the area. The currents at the northern site were very slow (average approx. 1 cm/s) and correlation between currents at 300 m and 800 m was poor. The currents over the Moroccan continental slope were faster (average of 2.7 cm/s), with a prevailing flow along the slope towards Gibraltar. To test an assumption that the geostrophic current is faster along the Moroccan continental slope, three floating vertical currentmeters were released and acoustically tracked for several days. This revealed that the current is faster in that area and that it accelerates towards Gibraltar. CTD and STD data showed an upward bending of isolines towards the Moroccan continental slope. Contours of salinity and potential temperature probably show the meandering upper-layer structure and not the fully developed anticyclonic gyre. Rotary spectra and autospectra of the low-frequency current velocity data show significant peaks around 2, 3, and perhaps 14 days. GRA

N85-17505# Department of the Navy, Washington, D. C.
A METHOD FOR AUTOMATIC WATER MASS CLASSIFICATION Patent Application
R. E. Coulter and C. W. Horton, inventors (to Navy) Filed 6 Sep. 1984 9 p
(AD-D011405; US-Patent-Appl-SN-647777) Avail: NTIS HC A02/MF A01 CSCL 08/10

A method for automatic water mass classification from satellite radiometric data uses Bayesian decision theory. The mean, standard deviation and gradient of corrected satellite infrared temperature data is computer with a window and assigned to the center pixel. The probability for each statistic is computed for each class of ocean front/water mass based upon historical statistical values. The class having the maximum probability is then tested to reduce the chance of the misclassification. The result is a class value assigned to each pixel position representative of a particular oceanic front/water mass. Author (GRA)

N85-17506# Department of the Navy, Washington, D. C.
A METHOD FOR DETERMINING MESOSCALE DYNAMIC TOPOGRAPHY Patent Application
J. L. Mitchell, inventor (to Navy) Filed 22 Feb. 1984 13 p
(AD-D011412; US-Patent-Appl-SN-582412) Avail: NTIS HC A02/MF A01 CSCL 08/10

A method for determining mesoscale dynamic topography places a satellite altimeter into a properly selected, exact repeating orbit. The proper mesoscale sampling strategy depends upon the nature of the frequency/wavenumber response of the mesoscale ocean which is different in different regions of the global ocean. The result is altimetry data completely free of geoid contamination and having an order of magnitude alleviation of the problem of temporal undersampling. Author (GRA)

N85-17507# California Inst. of Tech., Pasadena. Seismological Lab.
DETAILED OCEANIC CRUSTAL MODELING Final Report, 1 Feb. 1981 - 31 May 1984
D. V. Helmberger 7 Nov. 1984 138 p
(Contract N00014-76-C-1070)
(AD-A148589) Avail: NTIS HC A07/MF A01 CSCL 08/10

The research performed under this contract can be divided into 3 main topics: changes in existing methods, Cagniard de-Hoop and WKBJ, which enable construction of synthetics for mixed path simulations; use of long period SH waves with source in the Northwest Atlantic and receivers on the northeast coast of North America to derive an oceanic upper mantle shear velocity model; and a technique based on evaluating the Kirchoff-Helmholtz integral for predicting the effect of near source or near receiver structure complexity on far field p waves. In Section 2 we assess the fact that recent models of upper mantle structure based on long period body waves (WWSSN) suggest large horizontal gradients, especially in shear velocities. Some changes in existing methods are required to construct synthetics for mixed path situations. This is accomplished by allowing locally dipping structure and making some modifications to generalized ray theory. In Section 3, we have modeled the SH motion from earthquakes in the northwest Atlantic ocean to derive an oceanic upper mantle shear velocity model. In Section 4, we extend the Kirchoff-Helmholtz integral method to calculate acoustic potentials which transmit through three dimensional warped boundaries. GRA

N85-17233*# Royal Aircraft Establishment, Farnborough (England).
THE INVESTIGATION OF SELECTED OCEANOGRAPHIC APPLICATIONS OF SPACEBORNE SYNTHETIC-APERTURE RADAR
G. E. Keyte, B. C. Barber, M. B. Barnes, G. C. White, M. Bagg (Admiralty Underwater Weapons Establishment), B. dOlier (City of London Polytechnic), and N. Lynn (Royal Naval Coll.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 6 p (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08C

N85-17235*# International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).
MONITORING OF THE TIDAL DYNAMICS OF THE DUTCH WADDENSEA BY SIR-B
B. N. Koopmans, D. vanderZee, A. Th. Verstappen, T. Woldai, and H. Hoschititzky *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 4 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08C

N85-17253*# Office of Naval Research, Arlington, Va.
SAR INTERNAL WAVE SIGNATURE EXPERIMENT
R. S. Winokur, J. R. Apel (APL, Laurel, Md.), and R. F. Gasparovic (APL, Laurel, Md.) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p refs (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 08C

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N85-17508*# Marquette Univ., Milwaukee, Wis. Dept. of Biology.
EFFECT OF DISUSE ON SARCOPLASMIC RETICULUM IN FAST AND SLOW SKELETAL MUSCLE
D. H. Kim, Frank A. Witzmann, and Robert H. Fitts 1982 5 p refs Repr. from the Am. J. of Physiol., no. 243, 1982 p C156-C160
(Contract NAS9-15711; Grants NIH-AM-22037; NIH-AM-00810)
(NASA-CR-174337; NAS 1.26:174337) Copyright. Avail: NTIS HC A02/MF A01 CSCL 06B

The effect of 6 weeks of hindlimb immobilization on rat skeletal muscle sarcoplasmic reticulum (SR) was determined in the

slow-twitch, type 1 soleus (SOL), the fast-twitch, type 2A deep region of the vastus lateralis (DVL), and the fast-twitch, type 2B superficial region of the vastus lateralis (SVL). Immobilization produced a significant decline in the Ca(2+) uptake rate (V sub max) of SR vesicles from the slow SOL, while the SR V sub max increased in the fast SVL and was unaltered in the DVL. Vesicles from the fast SVL and DVL also exhibited a higher total Ca(2+) uptake capacity following immobilization. An evaluation of the time course of the immobilization-mediated effect revealed an increased Ca(2+) uptake capacity in all three samples after 1 wk. In the SOL total Ca(2+) uptake returned to control level after 2 wk, while in the fast-twitch muscles the higher capacities were maintained. The Ca(2+)-stimulated SR ATPase activity was not altered in any of the muscle studies. R.S.F.

N85-17509*# Marquette Univ., Milwaukee, Wis. Dept. of Biology.

ACID PHOSPHATASE AND PROTEASE ACTIVITIES IN IMMOBILIZED RAT SKELETAL MUSCLES

Frank A. Witzmann, John P. Troup, and Robert H. Fitts 13 Apr. 1982 6 p refs Repr. from the Can. J. of Physiol. and Pharmacol. (Canada), v. 60, no. 12, 1982 p 1732-1736

(Contract NAS9-15711; Grants NIH-AM-22037; NIH-AM-00810)

(NASA-CR-174340; NAS 1.26:174340) Avail: NTIS HC A02/MF A01 CSCL 06B

The effect of hind-limb immobilization on selected lysosomal enzyme activities was studied in rat hing-limb muscles composed primarily of type 1. 2A, or 2B fibers. Following immobilization, acid protease and acid phosphatase both exhibited signifcant increases in their activity per unit weight in all three fiber types. Acid phosphatase activity increased at day 14 of immobilization in the three muscles and returned to control levels by day 21. Acid protease activity also changed biphasically, displaying a higher and earlier rise than acid phosphatase. The pattern of change in acid protease, but not acid phosphatase, closely parallels observed muscle wasting. The present data therefore demonstrate enhanced proteolytic capacity of all three fiber types early during muscular atrophy. In addition, the data suggest a dependence of basal hydrolytic and proteolytic activities and their adaptive response to immobilization on muscle fiber composition. Author

N85-17510*# Marquette Univ., Milwaukee, Wis. Dept. of Biology.

A COMPARISON OF RAT MYOSIN FROM FAST AND SLOW SKELETAL MUSCLE AND THE EFFECT OF DISUSE

Brian R. Unsworth, Frank A. Witzmann, and Robert H. Fitts 14 Jul. 1981 8 p refs Repr. from the J. of Biol. Chem. (US), v. 257, no. 24, 25 Dec. 1982 p 15129-15136

(Contract NAS9-15711; Grants NIH-AM-22037; NIH-AM-00810)

(NASA-CR-174339; NAS 1.26:174339) Avail: NTIS HC A02/MF A01 CSCL 06C

Certain enzymatic and structural features of myosin, purified from rat skeletal muscles representative of the fast twitch glycolytic (type IIb), the fast twitch oxidative (type IIa), and the slow twitch oxidative (type I) fiber, were determined and the results were compared with the measured contractile properties. Good correlation was found between the shortening velocities and Ca(2+)-activated ATPase activity for each fiber type. Short term hind limb immobilization caused prolongation of contraction time and one-half relaxation time in the fast twitch muscles and a reduction of these contractile properties in slow twitch soleus. Furthermore, the increased maximum shortening velocity in the immobilized soleus could be correlated with increased Ca(2+)-ATPase, but no change was observed in the enzymatic activity of the fast twitch muscles. No alteration in light chain distribution with disuse was observed in any of the fiber types. The myosin from slow twitch soleus could be distinguished from fast twitch myosins on the basis of the pattern of peptides generated by proteolysis of the heavy chains. Six weeks of hind limb immobilization resulted in both an increased ATPase activity and an altered heavy chain primary structure in the slow twitch soleus muscle. R.S.F.

N85-17511# Civil Aeromedical Inst., Oklahoma City, Okla.

TOLERANCE ENDPOINT FOR EVALUATING THE EFFECTS OF HEAT STRESS IN DOGS

G. D. Hanneman and J. L. Sershon Jun. 1984 25 p

(AD-A148104; FAA-AM-84-5) Avail: NTIS HC A02/MF A01 CSCL 06/19

Animals occasionally die from heat stress encountered during shipment in the nation's transportation systems. To provide a basis for a series of studies on shipping crates, environmental conditions, etc., as may be encountered in air transport of dogs, we sought to establish a suitable tolerance endpoint for heat/humidity stress in dogs. We monitored the heart rate, respiratory/panting rate, and rectal temperature of 10 male beagle dogs exposed to an air temperature of 95 + or - 1 F (relative humidity 93 + or - 2 percent) for less than 24 hours. Of the first six animals, two died during exposure, two died after being removed from the test chamber, and two survived a 24-hour exposure. Based on observations from these six dogs, a rectal temperature of 108 F was tentatively chosen as the tolerance endpoint for subsequent tests. Of four additional animals tested, two were removed from the environmental chamber when their rectal temperature reached 108 F and the two others finished the test with a rectal temperature not exceeding 102.7 F. No ill effects were noted in any of the surviving six animals during a 7-day post-observation period. These and subsequent findings indicate a rectal temperature of 108 F can be safely tolerated and can serve as a tolerance limit for additional studies of heat and humidity effects on dogs. GRA

N85-17512# Aspen Center for Physics, Colo.

WORKSHOP ON MEMBRANE BIOPHYSICS

15 Jul. 1984 28 p Conf. held in Aspen, Colo., 25 Jun. - 15 Jul. 1984

(Grant N00014-84-G-0098)

(AD-A148238) Avail: NTIS HC A03/MF A01 CSCL 06/16

Workshop on membrane biophysics was to collect together a group of biologists and biophysicists with common interests in membrane biology. Our aim was to get a fairly diverse group to promote cross-fertilization of ideas among different specialties in membrane biophysics. In the event, there were fourteen lectures spread over a period of three weeks from invitees, with an additional lecture on cell-cell contacts by Dr. George Bell (Los Alamos). The abstracts for the invited lectures are included to form the report of the workshop. The subject matter may be classified as follows: Excitable membranes and voltage controlled gates; Photosynthetic reaction centers; Acetylcholine receptor; Visual transduction; Motility mechanism in bacteria; Protein-protein interactions. GRA

N85-17513# Letterman Army Inst. of Research, San Francisco, Calif. Toxicology Group.

ACUTE ORAL TOXICITY (LD50) OF 4-NITROPHENYL MONOCHLOROMETHYL (PHENYL) PHOSPHINATE (TA009) IN MALE RATS Final Report, 22 Sep. - 19 Oct. 1982

Craig W. White, Justo Rodriguez, and Thomas P. Kellner Oct. 1984 27 p

(DA Proj. 351-62771-A-875)

(AD-A148337; LAIR-191; TOXICOLOGY/SER-55) Avail: NTIS HC A03/MF A01 CSCL 06/20

The acute oral toxicity of 4-nitrophenyl monochloromethyl (phenyl) phosphinate was determined in male, albino, Sprague-Dawley rats by using the oral gavage dose method. LD1, LD50, and LD95 with the 95% confidence limit were calculated by probit analysis. The LD50 was 203 mg/kg with the 95% confidence limit (142 mg/kg, 292 mg/kg). The formulation falls in the very toxic range. GRA

N85-17514# Professional Staff Association of Los Angeles County/-Univ. of Southern California Medical Center, Los Angeles.

BIBLIOGRAPHY OF VENOMOUS AND POISONOUS MARINE ANIMALS AND THEIR TOXINS Final Report, 1969 - 1982

Findlay E. Russell, Henry Gonzalez, Sue B. Dobson, and John A. Coats Feb. 1984 425 p Prepared in cooperation with Arizona Univ., Tucson

(Contract N00014-80-C-0868)
(AD-A148409) Avail: NTIS HC A18/MF A01 CSCL 06/3

This bibliography includes a list of the titles and citations of most of the papers on the subject of venomous and poisonous marine organisms and their toxins published before 1981. It contains 6,779 citations listed by major phyletic group (principally by phylum). Also included is an author index. GRA

N85-17515# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES Abstracts Only
7 Jan. 1985 43 p refs Transl. into ENGLISH of various Russian articles
(JPRS-UBB-85-001) Avail: NTIS HC A03/MF A01

Various topics relating to the life sciences are discussed, including biochemistry, biophysics, food techcnology, laser effects, marine mammals, and medicine. In addition, microbiology, nonionizing electromagnetic radiation, pharmacology, physiology, public health, radiation biology, and virology are considered. For individual titles, see N85-17516 through N85-17524.

N85-17516# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF GEOMAGNETIC DISTURBANCES ON CARDIOVASCULAR FUNCTION OF ATHLETES Abstract Only **c52**
G. V. Ryzhikov and T. D. Dzhebrailova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 19 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 640-646 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

Eleven men 20 to 30 years of age from a rifle firing team took part in the study. EKG and arterial pressure studies were performed before and after training and competition. The variation coefficient of R-R interval, index of intensity, and autonomic index were recorded. The results produced were compared with studies of the degree of disturbance, presence of magnetic storms, and their force and values of K intensity index for the time period. On days of magnetic disturbance there was a decrease in sports results. In terms of the degree of this decrease, the athletes can be divided into those resistant to magnetic disturbances, relatively resistant, and nonresistant. The increase is sympathetic influences on cardiac activity during geomagnetic disturbances was observed in those cases when the autonomic index was initially close to zero, particularly when magnetic storms began suddenly. Athletes with strong sympathetic influence on cardiac activity were more resistant to the effects of geomagnetic storms. Author

N85-17517# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL INTER-HEMISPHERE ASYMMETRY IN RECOGNITION OF VISUAL STIMULI OF VARIOUS CLASSES Abstract Only **c52**
G. P. Udalova and I. A. Kashina *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 19-20 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 578-588 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

The variation in degree of brain hemisphere dominance was determined as a function of the class of visual stimuli and time parameters of their presentation, nature of the visual task, specifics of motor reaction, and sex of the test subjects. A set of achromatic slides with 5 classes of stimuli were utilized. Fifty healthy test subjects of both sexes participated. Processing of the experimental material indicated the presence, upon visual recognition, of a certain variation of the direction and degree of manifestation of interhemisphere asymmetry as a function of the level of verbal processing of the images presented, the degree of utilization of abstract and concrete characteristics of the stimulus, its emotional coloration, time parameters of stimulation, specifics of implementation of motor reaction, and sex of the test subjects. These factors should be considered when visual stimuli are used in clinical practice as tests for topic diagnosis of brain image. R.S.F.

N85-17518# Joint Publications Research Service, Arlington, Va.
ENCEPHALOGRAPHIC CORRELATES OF AUTOGENOUS CHANGE IN HUMAN FUNCTIONAL STATE **c52**
A. A. Antonov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 20 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 594-596 tls Abstract Only (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

The influence of respiratory exercise used to optimize physical condition before sports contests on the functioning of the central nervous system was studied. Twelve healthy men 28 to 35 years of age were studied in a light-and-sound-insulated chamber in the morning hours. Each subject was studied 4 times at intervals of 6 to 12 days. The MMPI test was used to evaluate the emotional-mental state before each session. EEG's were recorded bipolarly in two leads from the left hemisphere with a time constant of 0.1 over 400 seconds in each stage of the study. The breathing exercises caused a change in the level of spatial synchronization of bioelectric activity of the frontal-temporal and temporal-occipital segments of the cerebral cortex. Depending on the initial emotional-mental state of the subjects, breathing exercises caused an increase in reduced or a decrease in elevated levels of spatial synchronization of bioelectric activity in these areas of the cortex. Author

N85-17519# Joint Publications Research Service, Arlington, Va.
DYNAMICS OF EXTERNAL RESPIRATION AND GAS METABOLISM UNDER COMBINED EFFECT OF HYPOXIA AND HYPERCAPNIA Abstract Only **c52**
N. A. Agadzhanyan, L. Kh. Bragin, G. A. Davydov, and Yu. A. Spasskiy *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 21 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 610-616 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

Two series of experiments were performed involving 20 healthy men 20 to 30 years of age. One series of studies was performed in the plains, another in the mountains. In studies of series IA after breathing air the subjects were shifted each 15 minutes to breathing of normoxic gas mixtures with partial carbon dioxide pressure 19, 38, and 57 mm Hg. In series IB-D the partial pressure of oxygen was decreased in stages to 130, 100, and 70 mm Hg. In series IIA and B, the oxygen partial pressure corresponded to the oxygen content in the surrounding mountain air, 105 to 110 mm Hg, while the carbon dioxide partial pressure was increased to 19 and 38 mm Hg. All studies were performed at rest in a seated position, except IIB, in which the test subjects performed light work on a bicycle ergometer. The experiments show that a change in the number of physiological indices upon development of hypercapnia during various stages of mountain adaptation at rest are retained under moderate physical loading. Author

N85-17520# Joint Publications Research Service, Arlington, Va.
FACTORS DETERMINING EFFECTIVENESS OF VOLUNTARY DECREASE IN VENTILATION DURING MUSCULAR WORK USING INSTRUMENTED FEEDBACK Abstract Only **c52**
S. N. Kuchkin *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 21-22 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 623-630 Original language document was announced in IAA as A84-46537 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

Experiments were conducted on eight subjects, 17-18 years of age. It is shown that a voluntary reduction of the level of ventilation under increasing muscular loads can be achieved through instrumented feedback in the range of 60-80 percent of the reference level and is limited by the imperative breathing stimulus (due mainly to progressive hypercapnia). The efficiency of the voluntary reduction is shown to depend on three factors: (1) the type of working hypernea according to the pattern of P(A)CO2 under increasing loads; (2) the basal type of breathing

pattern; and (3) the degree to which the habit of voluntary control of breathing has been learned. B.J. (IAA)

N85-17521# Joint Publications Research Service, Arlington, Va.
HYPERBARIC PHYSIOLOGY (STATUS AND PROSPECTS) Abstract Only **c52**
G. L. Zaltsman *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 22 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 659-673 Original language document was announced in IAA as A84-46540 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

A description is given of human physiology in a hyperbaric environment, and attention is paid to the effects of hyperbaric environments on physiological processes and structures of the human body, to the physiological foundations for the mastering of hyperbaric environments, to the effects of hyperbaric environments on pathological processes, and to therapeutic applications of hyperbaric environments. Tables enumerating extremal factors of hyperbaric environments and corresponding adaptive and pathological reactions are given. B.J. (IAA)

N85-17522# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF ACTIVATION OF ASFS-2 ON HUMAN EMOTIONAL STATUS Abstract Only **c53**
A. V. Mirolyubov, I. L. Solomin, and A. Yu. Shikin *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 23 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Ju. - Aug. 1984 p 674-675 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

The moderating effect of rhythmic photostimulation in treating organic hyperkinesis such as Parkinson's disease was studied. The change in emotional status of healthy persons after a series of artificial stable functional connections (ASFS-2) stimuli was investigated. It was noted that during the therapeutic photostimulation, the hyperkinesia decrease and the mental status of the patient improves noticeably, manifested as an increase in the level of mental activity, improvement in general feeling, and an increase in volume of short-term memory. Group 1 received a single injection of 30 mg of ethimizol i/m. Group 2 received sessions of photostimulation with a gas discharge photostimulator at 15 Hz for 5 seconds. Group 3 received the injection of ethimizol, followed 30 minutes later by photostimulation (asfs-2). The course of ASFS-2 stimulation significantly activated and balanced the emotional state of the subjects, as a result of involvement in the artificial stable connection of the emotiogenic structures of the brain. R.S.F.

N85-17523# Joint Publications Research Service, Arlington, Va.
SIMULTANEOUS DETERMINATION OF RADIATION AND CONVECTION HEAT TRANSFER Abstract Only **c52**
A. N. Sinitsyn and Yu. A. Ivanov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 23-24 Transl. into ENGLISH from Gigiyena i Sanit. (Moscow), no. 7, Jul. 1984 p 43-45 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

Heat transfer by radiation and convection was analyzed mathematically to design a relatively simple approach for determining human heat balance in situations where both factors are at play. Proceeding from the general physical laws of heat transfer, where convective transfer (q sub c is proportional to the temperature difference between body surface (T sub s) and air (T sub a), and radiation transfer (q sub r) is proportional to the difference between T sub s and the mean temperature of surrounding surfaces (mean radiation temperature, T sub r), the following equation can be derived (q sub rc = (q sub) + (q sub c) = alpha sub r + alpha sub c) (T sub s - RCT). In the equation, q sub rc is the rate of heat exchange by radiation and convection, alpha sub c and alpha sub r are heat transfer coefficients between a body and its surroundings via convection and radiation, respectively, and RCT = radio-convective temperature = (alpha sub c)(T sub a) + (alpha sub r)(T sub r)/(alpha sub c) + (alpha sub r). R.S.F.

N85-17524# Joint Publications Research Service, Arlington, Va.
EFFECTS OF PROLONGED HYPOKINESIA ON NERVOUS SYSTEM Abstract Only **c52**
T. N. Krupina, Kh. Kh. Yarullin, and A. Ya. Tizul *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1982 p 24 Transl. into ENGLISH from Sov. Med. (Moscow), no. 8, Aug. 1984 p 27-31 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

Male volunteers were tested for the physiological consequence of extended, limited motor activity in relation to age and state of health. The experimental conditions included long periods of submersion, sensory deprivation, clinistatic and anti-orthostatic hypokinesia, etc. The systems showing the earliest signs of decompensation included the autonomic nervous system, particularly its vasomotor component, neuropsychiatric interactions, and certain metabolic processes (especially water-electrolyte balance and lipid metabolism). Other systems evidencing altered functional status were the neuroendocrine and immune systems, with the most pronounced onset on physiological imbalance becoming evident after two months of limited motor activity. These observations point to the need for a regular exercise program during space flight to maintain optimum performance during periods of restricted physical activity, and to facilitate physiological recovery once periods of inactivity are over. R.S.F.

N85-17230*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE USE OF DIGITAL SPACEBORNE SAR DATA FOR THE DELINEATION OF SURFACE FEATURES INDICATIVE OF MALARIA VECTOR BREEDING HABITATS
M. L. Imhoff, C. H. Vermillion, and F. A. Khan (Space Research and Remote Sensing Organization, Dacca, Bangaladesh) *In* JPL The SIR-B Sci. Invest. Plan 1 Jul. 1984 3 p ref (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 06C

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N85-17525*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Jan. 1985 58 p
(NASA-SP-7011(266); NAS 1.21:7011(266)) Avail: NTIS HC $7.00 CSCL 06E

This bibliography lists 148 reports, articles and other documents introduced into the NASA scientific and technical information system in December 1984. Author

N85-17526* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 268
Feb. 1985 65 p
(NASA-SP-7011(268); NAS 1.21:7011(268)) Avail: NTIS HC A04 $7.00 CSCL 06E

This bibliography lists 167 reports, articles and other documents introduced into the NASA scientific and technical information sysem in January 1985. Author

N85-17527# Naval Health Research Center, San Diego, Calif.
LABORATORY NOTE: EFFECT ON SLEEP LATENCY OF PRE-SLEEP AEP (AUDITORY EVOKED POTENTIAL) PROCEDURES Interim Report, Sep. 1982 - Jun. 1984
C. L. Spinweber Jun. 1984 7 p

(MR0-4101)
(AD-A147620; NAVHLTHRSCHC-84-17) Avail: NTIS HC A02/MF A01 CSCL 05/10

In a 12-night study of the effects of 1-tryptophan in poor sleepers, waking auditory evoked potentials (AEPs) were obtained prior to lights out on the third placebo-baseline night and fifth treatment night. Sleep latencies were significantly shorter on both AEP nights. The components of the AEP procedure may facilitate sleep onset by promoting relaxation and lowering psychophysiological arousal level in poor sleepers. GRA

N85-17528# Army Research Inst. of Environmental Medicine, Natick, Mass.
THERMOREGULATORY RESPONSES DURING EXERCISE AT GRADED HYPOHYDRATION LEVELS
M. N. Sawka, A. J. Young, R. P. Francesconi, S. R. Muza, and K. B. Pandolf 5 Nov. 1984 32 p
(DA Proj. 3E1-62777-A-879)
(AD-A147733; USARIEM-M-7/85) Avail: NTIS HC A03/MF A01 CSCL 06/19

This study examined the effects of graded hypohydration levels on thermoregulatory responses during exercise in the heat. Eight heat acclimated male volunteers attempted four Heat Stress Tests (HST'S). One HST was attempted during euhydration, and three HST's were attempted while the subjects were hypohydrated by 3%, 5% and 7% of their body weight. Hypohydration was achieved by an exercise-heat regimen on the day prior to each HST. After 30-min of rest in a 20 C antechamber, the HST consisted of a 140-min exposure (four repeats of 10-min rest and 25-min treadmill walking) in a hot-dry (49 C, 20% rh) environment. The following new observations were made: (1) a low hypohydration level primarily reduced plasma volume with little effect on plasma osmolality, whereas, a more severe hypohydration level resulted in no further plasma volume reduction but a large increment in plasma osmolality; (2) core temperature and heart rate responses were increased with severity of hypohydration; (3) sweating rate responses for a given rectal temperature were systematically decreased with severity of hypohydration; and (4) the reduction in sweating rate was more strongly associated with plasma hyperosmolality than to hypovolemia. GRA

N85-17529# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
AVIATION-RELATED CARDIORESPIRATORY EFFECTS OF BLOOD DONATION IN FEMALE PILOTS
Michael T. Lategola, Audie W. Davis, Jr., Ronald O. Gilcher (Oklahoma Blood Inst.), Peggy J. Lyne, and Mary Jo Burr Mar. 1984 37 p
(AD-A148045; AD-E850735; FAA/AM-84-4) Avail: NTIS HC A03/MF A01 CSCL 06/19

Ten healthy female pilots, 20-49 years old and weighing more than 110 pounds were tested for tolerances to hypoxia orthostatic stress, and physical work at 1 and 3 d after donating about 450 mL of blood on one occasion, and 6 mL (sham control) on a second separate occasion. Testing included consecutive 30-min seated exposures to each of four oxygen-nitrogen mixtures (equal to air breathing at 6,000, 8,000, 10,000 and 12,400 ft of altitude), 5 min of quiet standing, and seated pedal ergometry braded to produce a heart rate of 140 beats per min. The findings of this study indicated that, if the complete absence of adverse symptoms at ground level, a pilot may return to flying between 1 and 3 d after blood donation with the recommended initial precautions that: cabin altitude be limited to < 6,000 during flight; and +Gz stress exceeding the equivalent of short-duration level turns at 30 deg of bank angle be avoided. Until complete restoration of the pilot's in-flight physiological tolerances has occurred, the presence of a copilot and on-board availability of supplemental oxygen are also recommended. GRA

N85-17530# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE EFFECT OF BETA ADRENERGIC BLOCKADE ON RATINGS OF PERCEIVED EXERTION M.S. Thesis - Arizona Univ.
A. A. Hartzell 1984 120 p
(AD-A148053; AFIT/CI/NR-84-89T) Avail: NTIS HC A06/MF A01 CSCL 06/19

The purpose of this study was to describe the effect of beta blockade and endurance training on ratings of perceived exertion (RPE). Forty-seven healthy but sedentary male subjects, age 17 to 34 years, were randomly assigned to one of three groups, i.e. placebo, propranolol (160 mg/day) and atenolol (100 mg/day), and completed a 15-week endurance training program. Training responses were evidenced in all groups by increases in maximal oxygen uptake and ventilation, along with a reduction in maximal heart rate. RPE was significantly reduced post-training in both the blocked and unblocked conditions. However, RPE for the same relative work rate was unchanged in all three groups. Thus, beta blockade does not attenuate the normal physiological response to endurance training, nor does it affect RPE when expressed in relative terms. Therefore, RPE can be used in exercise prescription to monitor relative exercise intensity. GRA

N85-17531# Civil Aeromedical Inst., Oklahoma City, Okla.
EFFORTS TO IMPROVE AVIATION MEDICAL EXAMINER PERFORMANCE THROUGH CONTINUING MEDICAL EDUCATION AND ANNUAL PERFORMANCE REPORTS
J. R. Dille and J. L. Harris Aug. 1984 10 p
(AD-A148078; FAA-AM-84-7) Avail: NTIS HC A02/MF A01 CSCL 06/5

Continuing medical education (CME) serves to maintain or increase the knowledge, interpretive proficiencies, and technical skills that a physician uses in his/her practice of medicine. Resulting improvement in professional performance is frequently difficult to measure, particularly in aerospace medicine, but CME is required for relicensure and/or or medical society membership in 70% of states. The Civil Aeromedical Institute first received American Medical Association approval for Category 1 CME credit for attendance at FAA seminars in January 1973. We began preparing 21-item annual performance reports for each aviation medical examiner (AME) in 1979 to attempt to isolate the causes of, and to reduce, computer rejection of about one-fourth of all medical certification input because of omissions or procedural errors. There was little improvement in error rate through 1982. We are presently conducting special sessions and open-book tests for new AME's, lecturing to military flight surgeons, and encouraging Regional Flight Surgeons to review reports of physical examinations from new and frequent-error AME's. GRA

N85-17532# Naval Health Research Center, San Diego, Calif.
TECHNIQUE FOR MEASURING BODY CIRCUMFERENCES AND SKINFOLD THICKNESSES Interim Report
M. B. Beckett and J. A. Hodgdon Aug. 1984 45 p
(AD-A148166; NAVHLTHRSCHC-84-39) Avail: NTIS HC A03/MF A01 CSCL 06/5

Anthropometry is measurement of the human body. It can be used to estimate body composition, to describe body build, and in the design of equipment to match human form. This report provides complete instructions for the measurement of 12 body circumferences and 8 skinfolds. When used as a teaching device, this report will allow previously untrained personnel to perform anthropometry in an accurate and reliable manner. GRA

N85-17533# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
HEALTH EXAMINATION FINDINGS AMONG ACTIVE CIVIL AIRMEN
C. F. Booze, Jr. Aug. 1984 13 p
(AD-A148325; FAA-AM-84-8) Avail: NTIS HC A02/MF A01 CSCL 06/5

It has been the policy of the Federal Aviation Administration to medically certify individuals, for a variety of flying privileges, who have a medical deficiency or disease, provided it can be determined that such action does not compromise air safety. During recent years, for example, standards have been relaxed with respect to contact lens use and medication allowed for control of hypertension. This descriptive epidemiologic study presents the point prevalence of pathology among active airmen as of Jan-

uary 1, 1984. Data were obtained from active computer files maintained by the Aeromedical Certification Branch of the Civil Aeromedical Institute in connection with the certification program. Cardiovascular, eye, and abdominal pathologies represent the most prevalent medical conditions among active airmen (5.9%, 4.4%, and 4.0% respectively). Hypertension is the most frequently occurring cardiovascular condition. Of particular interest is the current certification of 263 airmen who have undergone coronary artery bypass. Some 324,986 active airmen (45%) require correction for some visual deficiency. Of this total, 20,355 are contact lens wearers. History of kidney stones is the most common genitourinary/abdominal finding. Prevalence of pathology among active civil airmen, while still considerably less than among the general population, is increasing due to current and past emphasis on relaxation of regulatory requirements when consistent with safety. GRA

N85-17534# Virginia Univ., Charlottesville. Dept. of Neurosurgery.
DIRECT ASSESSMENT OF SYNAPTIC MODIFICATION RULES Annual Scientific Report
William B. Levy 15 Jun. 1984 5 p
(Grant AF-AFOSR-0236-83; AF Proj. 2312)
(AD-A148376; AFOSR-84-1015TR) Avail: NTIS HC A02/MF A01 CSCL 06/16

Our objectives are to quantify synaptic modification rules and to understand them in a context of simple neural networks capable of pattern recognition and clustering. The experimental work plus considerations of parsimony favors one particular form of the excitatory synaptic modification rule. Modification of the translation of synaptic activation into cell firing may well the governed by a separate rule. Although different than the first rule, simple computer models show these two rules are together compatible and noncontradictory. GRA

N85-17535# Michigan Univ., Ann Arbor. Perception Lab.
DISCRIMINABILITY OF SIGNALS FROM NOISE IN A DYNAMIC STEREOSCOPIC SPACE Final Report, 1 Oct. 1981 - 1 Sep. 1984
W. R. Uttal 30 Nov. 1984 28 p
(Contract N00014-81-C-0266)
(AD-A148406; PERLAB-5) Avail: NTIS HC A03/MF A01 CSCL 05/10

The results of this work have been presented in two short reports and two long monographs which have been published as books. During the three years the project has been in existence 40 separate experiments have been carried out. The main mission of the project was to determine the manner in which constellations of dots were detected when embedded in random arrays of dots in two and three dimensions. GRA

N85-17536# Pennsylvania State Univ., University Park. Dept. of Industrial and Management Systems Engineering.
ADVANCED DEVELOPMENT OF AN ACTIVE NEUROMUSCULATURE RESPONSE TO MECHANICAL STRESS Final Report, 15 Apr. 1983 - 31 Oct. 1984
A. Freivalds 31 Oct. 1984 65 p
(Grant AF-AFOSR-0106-83)
(AD-A148436; AFOSR-84-1091TR) Avail: NTIS HC A04/MF A01 CSCL 06/16

The objective of this project was to further define and formulate methodologies for implementing active muscle responses into the present ATB (Articulated Total Body) mathematical model. An active neuromusculature response to mechanical stress was further developed. The basic mechanisms of muscle contraction at the fiber level, including the length-tension relationship, the force-velocity relationship and the active state function were reexamined. The basic fiber mechanisms were integrated into muscle systems utilizing motor unit organization, orderly recruitment of motor units and adjustments in force due to fatigue. The complete muscle systems were then used to replicate the human neuromusculature of the trunk and neck and for the elbow, shoulder, hip and knee joints. Preliminary simulations were of the human response to high accelerations compared favorably to experimentally obtained values. This muscularized ATB Model will serve as a useful cost effective tool for the study of air crew responses in high-G environments. GRA

N85-17537# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN INVESTIGATION OF SPINAL INJURY POTENTIAL FROM THE USE OF THE ACES 2 EJECTION SEAT BY LOWER WEIGHT FEMALE PILOTS M.S. Thesis
D. W. Abati and M. F. Belcher Sep. 1984 137 p
(AD-A148449; AFIT/GSM/LSY/84S-1) Avail: NTIS HC A07/MF A01 CSCL 06/19

Historically, ejection seat sled tests conducted to assess aviation injury potential to pilots have incorporated only the 5th through 95th percentile male weights. Since female pilots within the USAF have increased in number during the past seven years, it was estimated that risks associated with an ejection emergency for female pilots have not been adequately evaluated during ejection seat testing. The objectives of this thesis were to determine the percentage of female pilots who weigh less than the 5th percentile male and then to determine the spinal injury potential for these lower weight females with regard to the ACES 2 ejection seat. It was determined that the majority of female pilots are in a weight class below the 5th percentile male and that, based upon a computer model, the spinal injury potential is right at the acceptable limits. However, the authors caveat this second conclusion with the fact that a critical input to the computer that was used, the time-thrust curve for the DKU-5/A cartridge catapult, represented the thrust experienced by a 215 pound individual. Actual CKU-5/A test firings are scheduled to be accomplished in Sept. '84 before the second conclusion can be realistically accepted. GRA

N85-17538# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Human Factors.
PROCEEDINGS OF A WORKSHOP ON RESEARCH ISSUES IN SIMULATOR SICKNESS
Michael E. McCauley, ed. Oct. 1984 80 p Workshop held in Monterey, Calif., 26-28 Sep. 1983 Sponsored in part by AF and Army
(Contract N00014-81-C-0017; NR Proj. 196-167)
(AD-A148543) Avail: NTIS HC A05/MF A01 CSCL 06/19

Simulator sickness, with symptoms similar to motion sickness, occurs frequently in military and civilian flight trainers. Simulator sickness appears to be independent of whether a fixed base or moving base simulator is used. Methods for amelioration are described as well as recommendations for future research to develop countermeasures. GRA

N85-17539# Midwest Research Inst., Kansas City, Mo.
EFFECTS OF PYRIDOSTIGMINE ON PSYCHOMOTOR AND VISUAL PERFORMANCE Final Report, 1 Apr. 1983 - 31 Aug. 1984
C. Graham and M. R. Cook Sep. 1984 92 p
(Contract F33615-80-C-0606)
(AD-A148553; AFAMRL-TR-84-052) Avail: NTIS HC A05/MF A01 CSCL 06/15

Pyridostigmine is a reversible anticholinesterase inhibitor long used in the medical treatment of the neuromuscular disorder myasthenia gravis. Due to the site and the reversible nature of its action, this drug is currently being considered by the USAF for field use as a pretreatment medication to aid pilot survival in the event of a chemical attack. Medical reports indicate that high daily oral doses (600 mg/day) are well tolerated in patient populations. Recent NATO studies also suggest that lower dose regimens (30 mg, 3 x day, 30 days) can provide enhanced survival protection in nonclinical populations, with only minor gastric upset reported in a few individuals. Although health risks appear minimal, there exists a significant need to evaluate the impact of the drug on human functions important in pilot operations. The present study addressed this need. A double-blind, cross-over experimental design was used to evaluate the effects on oral regimen of

pyridostigmine (30 mg, 3 x day, 5 days) on the performance, physiology, and subjective state of 24 paid, male volunteers.
Author (GRA)

N85-17516# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF GEOMAGNETIC DISTURBANCES ON CARDIOVASCULAR FUNCTION OF ATHLETES Abstract Only
G. V. Ryzhikov and T. D. Dzhebrailova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 19 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 640-646 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

N85-17517# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL INTER-HEMISPHERE ASYMMETRY IN RECOGNITION OF VISUAL STIMULI OF VARIOUS CLASSES Abstract Only
G. P. Udalova and I. A. Kashina *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 19-20 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 578-588 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

N85-17518# Joint Publications Research Service, Arlington, Va.
ENCEPHALOGRAPHIC CORRELATES OF AUTOGENOUS CHANGE IN HUMAN FUNCTIONAL STATE
A. A. Antonov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 20 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 594-596 tls Abstract Only (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

N85-17519# Joint Publications Research Service, Arlington, Va.
DYNAMICS OF EXTERNAL RESPIRATION AND GAS METABOLISM UNDER COMBINED EFFECT OF HYPOXIA AND HYPERCAPNIA Abstract Only
N. A. Agadzhanyan, L. Kh. Bragin, G. A. Davydov, and Yu. A. Spasskiy *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 21 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 610-616 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

N85-17520# Joint Publications Research Service, Arlington, Va.
FACTORS DETERMINING EFFECTIVENESS OF VOLUNTARY DECREASE IN VENTILATION DURING MUSCULAR WORK USING INSTRUMENTED FEEDBACK Abstract Only
S. N. Kuchkin *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 21-22 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 623-630 Original language document was announced in IAA as A84-46537 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

N85-17521# Joint Publications Research Service, Arlington, Va.
HYPERBARIC PHYSIOLOGY (STATUS AND PROSPECTS) Abstract Only
G. L. Zaltsman *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 22 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 659-673 Original language document was announced in IAA as A84-46540 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

N85-17523# Joint Publications Research Service, Arlington, Va.
SIMULTANEOUS DETERMINATION OF RADIATION AND CONVECTION HEAT TRANSFER Abstract Only
A. N. Sinitsyn and Yu. A. Ivanov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 23-24 Transl. into ENGLISH from Gigiyena i Sanit. (Moscow), no. 7, Jul. 1984 p 43-45 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

N85-17524# Joint Publications Research Service, Arlington, Va.
EFFECTS OF PROLONGED HYPOKINESIA ON NERVOUS SYSTEM Abstract Only
T. N. Krupina, Kh. Kh. Yarullin, and A. Ya. Tizul *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1982 p 24 Transl. into ENGLISH from Sov. Med. (Moscow), no. 8, Aug. 1984 p 27-31 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N85-17540# Pittsburgh Univ., Pa. Western Psychiatric Inst. and Clinic.
COGNITIVE ASYMMETRY AND OCCUPATION. COMPUTER PROGRAMMERS, STUDENTS, AND BANK PERSONNEL, PART 1 AND PART 2
H. W. Gordon and K. Kronz Sep. 1984 33 p
(Contract N00014-83-K-0208)
(AD-A147125; TR-09-84-03) Avail: NTIS HC A03/MF A01 CSCL 05/10

System analysts and computer programmers of a university computer center performed better on visuospatial tasks usually attributed to the right cerebral hemisphere. By contrast, subjects from a human resources department of a bank performed better on verbal/sequential tasks associated with the left hemisphere. The cognitive profile was significantly different although the overall performance was not different between the groups. In a second study with an intermediate computer class, there was a significant correlation between the cognitive profile favoring visuospatial skills and scores on computer projects in which the students used their own ingenuity. There was no correlation with scores that depended on class notes or with scores on examinations. These results suggest that knowing the cognitive profile may be important in determining success in certain occupations. GRA

N85-17541# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN INVESTIGATION OF THE RELATIONSHIP BETWEEN STRESSFUL LIFE EVENTS AND PSYCHOLOGICAL, BEHAVIORAL AND PHYSIOLOGICAL OUTCOMES M.S. Thesis
B. E. Nielsen and R. L. Tremaine Sep. 1984 105 p
(AD-A147754; AFIT/GSM/LSY/84S-23) Avail: NTIS HC A06/MF A01 CSCL 05/10

Individuals in organizations are subjected to stress from a variety of sources. Problems and uncertainties on and off-the-job can cause stress in the individual. Stress effects have been estimated in 1983 to cost American organizations over 50 billion dollars annually. In an attempt to assess the impact of stress on Department of Defense personnel, the Air Force Institute of Technology administered the Life Events Survey (LES) to 76 individuals, measuring variables associated with 83 potentially stressful life events. Additionally, these participants completed a multi-inventory Stress Assessment Package (SAP-2) and contributed blood samples. This thesis statistically explored the relationship between the major stressful life events as measured in the LES and the following variables measured by the SAP-2: (1) perceived off-the-job stress, (2) perceived on-the-job stress, (3) ratio of total blood cholesterol with high density lipoprotein cholesterol, (4) job satisfaction, (5) intent to remain, and (6) Type A behavior characteristics. Job related stressful life events were found to be significantly related to job satisfaction and Type A behavior, and the life event of Vacations was found to be

significantly related to the ratio of total blood cholesterol to HDL cholesterol. Author (GRA)

N85-17542# Electronic Systems Div., Hanscom AFB, Mass.
TRAINING GUIDE FOR SCIENTIFIC AND ENGINEERING TRAINEES 1984
Jun. 1984 24 p
(AD-A147963; ESD-TR-84-184) Avail: NTIS HC A02/MF A01 CSCL 05/9

This Training Guide is to provide a unique opportunity to selected graduate engineers, mathematicians, and computer scientists to acquire applicable knowledge and experience in technical management with the guidance of the Electronic Systems Division Scientific and Engineering Career Panel. It is to provide trainees with an effective and meaningful entry into a technical management career. GRA

N85-17543# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Flight Dynamics Lab.
THE VALUE AND UTILITY OF INFLIGHT ONBOARD SIMULATION Final Report, Jul. 1983 - Jul. 1984
James A. Kocher Sep. 1984 101 p
(AF Proj. 2506)
(AD-A148033; AFWAL-TR-84-3092) Avail: NTIS HC A06/MF A01 CSCL 05/9

Onboard Simulation (OBS) provides computer-generated synthetic targets which are projected in the pilot's head-up display (HUD). The target changes size and perspective to account for relative position between the target and attacker. OBS was flight test demonstrated in the USAF Integrated Flight and Fire Control (IFFC) advanced development program. A review of IFFC experience with OBS is provided, including an estimate of direct cost savings attributed to OBS. A decision analysis is performed to assess the use of OBS for operational pilot training in aerial gunnery. Results indicate a training mix of OBS synthetic target encounters balanced with real target encounters can improve the quality of training. GRA

N85-17544# Perceptronics, Inc., Woodland Hills, Calif.
COMPATIBILITY EFFECTS AND PREFERENCE REVERSALS
A. Tversky and P. Slovic 21 Aug. 1984 110 p
(Contract N00014-82-C-0643)
(AD-A148399; PFTR-1127-84-8) Avail: NTIS HC A06/MF A01 CSCL 05/10

Recent studies of decision making show that people's preferences among risky and riskless prospects often depend on the manner in which the options are described or framed. Much as changes in vantage point alter the apparent size of objects, different representations of a given decision problem induce predictable changes in preferences. These findings violate the normative principle of invariance, which states that the preference order between prospects should not depend on the manner in which they are described. This study investigates the effect of elicitation method on preferences among simple gambles. Three strategically equivalent elicitation procedures, choice, pricing, and attractiveness rating, produced reversals of preference when the same pairs of gambles were evaluated under different procedures. These results are attributed to the compatibility effect, a tendency to weight more heavily those aspects of the stimulus that are most easily mapped into the response. This phenomenon is described by a differential weighting model in which the effect of the elicitation procedure on the relative weighting of the stimulus attributes is expressed by a bias parameter b. Implications of these and related findings for the theory and the practice of decision making are discussed. GRA

N85-17545# Illinois Univ., Champaign. Human Attention Research Lab.
TRAINING HIGH PERFORMANCE SKILLS: FALLACIES AND GUIDELINES Final Report, 1981 - 1983
Walter Schneider Aug. 1984 21 p
(Contract N00014-81-K-0034; NR Proj. 154-460)
(AD-A148574; HARL-ONR-8301) Avail: NTIS HC A02/MF A01 CSCL 05/9

A high performance skill is defined as one which: over 100 hours of training are required, substantial numbers of individuals fail to develop proficiency, and the performance of the expert is qualitatively different from that of the novice. Training programs for developing high performance skills are often based on assumptions that may be appropriate for simple skills. These assumptions can be fallacious when extended to high performance skills. Six fallacies of training are described. Empirical characteristics of high performance skill acquisition are reviewed. These include long acquisition periods, heterogeneity of component learning, development of inappropriate strategies, and training of time-sharing skills. A tentative set of working guidelines for the acquisition of high performance skills is described. GRA

N85-17522# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF ACTIVATION OF ASFS-2 ON HUMAN EMOTIONAL STATUS Abstract Only
A. V. Mirolyubov, I. L. Solomin, and A. Yu. Shikin *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) 7 Jan. 1985 p 23 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Ju. - Aug. 1984 p 674-675 (For primary document see N85-17515 08-51)
Avail: NTIS HC A03/MF A01

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N85-17546*# General Electric Co., Houston, Tex. Space Systems Div.
DESIGN CONCEPT DEFINITION STUDY FOR AN IMPROVED SHUTTLE WASTE COLLECTION SUBSYSTEM Final Report
30 Nov. 1984 326 p
(Contract NAS9-17182)
(NASA-CR-171834; NAS 1.26:171834) Avail: NTIS HC A15/MF A01 CSCL 06K

A no-risk approach for developing an Improved Waste Collection Subsystem (WCS) for the shuttle orbiter is described. The GE Improved WCS Concept builds on the experience of 14 Shuttle missions with over 400 man-days of service. This concept employs the methods of the existing flight-proven mature design, augmenting them to eliminate foreseen difficulties and to fully comply with the design requirements. The GE Improved WCS Concept includes separate storage for used wipes. Compaction of the wipes provides a solution to the capacity problem, fully satisfying the 210 man-day storage requirement. The added feature of in-flight serviceable storage space for the wipes creates a variable capacity feature which affords redundancy in the event of wipes compaction system failure. Addition of features permitting in-flight servicing of the feces storage tank creates a variable capacity WCS with easier post-flight servicing to support rapid turnaround of the Shuttle orbiter. When these features are combined with a vacuum pump to evacuate wipes and fecal storage tanks through replaceable odor/bacteria filters to the cabin, the GE Improved WCS satisfies the known requirements for Space Station use, including no venting to space. B.W.

N85-17547*# Springborn Labs., Inc., Enfield, Conn.
PROTOTYPE WASH WATER RENOVATION SYSTEM INTEGRATION WITH GOVERNMENT-FURNISHED WASH FIXTURE Final Report, 1 Oct. 1983 - 30 Sep. 1984
30 Sep. 1984 88 p refs
(Contract NAS9-17004)
(NASA-CR-171829; NAS 1.26:171829) Avail: NTIS HC A05/MF A01 CSCL 06K

The requirements of a significant quantity of proposed life sciences experiments in Shuttle payloads for available wash water to support cleansing operations has provided the incentive to

develop a technique for wash water renovation. A prototype wash water waste renovation system which has the capability to process the waste water and return it to a state adequate for reuse in a typical cleansing fixture designed to support life science experiments was investigated. The resulting technology is to support other developments efforts pertaining to water reclamation by serving as a pretreatment step for subsequent reclamation procedures. R.S.F.

N85-17548*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
IMPROVED ORBITER WASTE COLLECTION SYSTEM STUDY Final Report
P. H. Bastin 16 Nov. 1984 143 p refs
(Contract NAS9-17181)
(NASA-CR-171830; NAS 1.26:171830; MDC-H1360) Avail: NTIS HC A07/MF A01 CSCL 06K

Design concepts for improved fecal waste collection both on the space shuttle orbiter and as a precursor for the space station are discussed. Inflight usage problems associated with the existing orbiter waste collection subsystem are considered. A basis was sought for the selection of an optimum waste collection system concept which may ultimately result in the development of an orbiter flight test article for concept verification and subsequent production of new flight hardware. Two concepts were selected for orbiter and are shown in detail. Additionally, one concept selected for application to the space station is presented. R.S.F.

N85-17549*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
IMPROVED ORBITER WASTE COLLECTION SYSTEM STUDY, APPENDIX D Final Report
Nov. 1984 24 p refs
(Contract NAS9-17181)
(NASA-CR-171833; NAS 1.26:171833; MDC-H1360-App-D) Avail: NTIS HC A02/MF A01 CSCL 06K

Basic requirements for a space shuttle orbiter waste collection system are established. They are intended to be an aid in the development and procurement of a representative flight test article. Orbiter interface requirements, performance requirements, flight crew operational requirements, flight environmental requirements, and ground operational and environmental requirements are considered. R.S.F.

N85-17550*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPUTER SUBROUTINES FOR ESTIMATION OF HUMAN EXPOSURE TO RADIATION IN LOW EARTH ORBIT
Francis A. Cucinotta (Old Dominion Univ., Norfolk, Va.) and John W. Wilson Feb. 1985 26 p refs
(NASA-TM-86324; L-15865; NAS 1.15:86324) Avail: NTIS HC A03/MF A01 CSCL 06R

Computer subroutines to calculate human exposure to trapped radiations in low Earth orbit (LEO) on the basis of a simple approximation of the human geometry by spherical shell shields of varying thickness are presented and detailed. The subroutines calculate the dose to critical body organs and the fraction of exposure limit reached as a function of altitude of orbit, degree of inclination, shield thickness, and days in mission. Exposure rates are compared with current exposure limits. Author

N85-17551*# Houston Univ., Tex. Dept. of Mechanical Engineering.
CHARACTERIZATION OF HEAT TRANSFER IN NUTRIENT MATERIALS Final Report, 30 Apr. 1971 - 31 Dec. 1984
Larry C. Witte 7 Jan. 1985 6 p
(Contract NAS2-11676)
(NASA-CR-171841; NAS 1.26:171841) Avail: NTIS HC A02/MF A01 CSCL 06H

The processing and storage of foodstuffs in zero-g environments such as in Skylab and the space shuttle were investigated. Particular attention was given to the efficient heating of foodstuffs. The thermophysical properties of various foods were cataloged and critiqued. The low temperature storage of biological samples as well as foodstuffs during shuttle flights was studied. Research and development requirements related to food preparation and storage on the space station are discussed. R.S.F.

N85-17552*# Hamilton Standard, Windsor Locks, Conn.
WASTE COLLECTION SUBSYSTEM STUDY Final Report
Dec. 1984 125 p
(Contract NAS9-17183)
(NASA-CR-171836; NAS 1.26:171836; SVHSER-8931) Avail: NTIS HC A06/MF A01 CSCL 06K

Practical ways were explored of improving waste compaction and of providing rapid turnaround between flights at essentially no cost for the space shuttle waste collection subsystem commode. Because of the possible application of a fully developed shuttle commode to the space station, means of providing waste treatment without overboard venting were also considered. Three basic schemes for compaction and rapid turnaround, each fully capable of meeting the objectives, were explored in sufficient depth to bring out the characteristic advantages and disadvantages of each. Tradeoff comparisons were very close between leading contenders and efforts were made to refine the design concepts sufficiently to justify a selection. The concept selected makes use of a sealed canister containing wastes that have been forcibly compacted, which is removable in flight. No selection was made between three superior non-venting treatment methods owing to the need for experimental evaluations of the processes involved. A system requirements definition document has been prepared to define the task for a test embodiment of the selected concept. R.S.F.

N85-17553*# Fairchild Republic Co., Farmingdale, N. Y.
SPACE SHUTTLE ORBITER WASTE COLLECTION SYSTEM CONCEPTUAL STUDY Final Report
M. Abbate 18 Jan. 1985 142 p
(Contract NAS9-17223)
(NASA-CR-171844; NAS 1.26:171844; MS254V1003) Avail: NTIS HC A07/MF A01 CSCL 06K

The analyses and studies conducted to develop a recommended design concept for a new fecal collection system that can be retrofited into the space shuttle vehicle to replace the existing troublesome system which has had limited success in use are summarized. The concept selected is a cartridge compactor fecal collection subsystem which utilizes an airflow collection mode combined with a mechanical compaction and vacuum drying mode that satisfies the shuttle requirements with respect to size, weight, interfaces, and crew comments. A follow-on development program is recommended which is to result in flight test hardware retrofitable on a shuttle vehicle. This permits NASA to evaluate the system which has space station applicablity before committing production funds for the shuttle fleet and space station development. R.S.F.

N85-17554# North Carolina Agricultural and Technical State Univ., Greensboro. Dept. of Industrial Engineering.
A COMPUTER AIDED MULTI-MAN-MACHINE WORK AREA DESIGN AND EVALUATION SYSTEM (MAWADES) Final Report
B. M. Pulat Aug. 1984 77 p
(Contract N00014-81-C-0320)
(AD-A147950) Avail: NTIS HC A05/MF A01 CSCL 05/5

MAWADES is a computerized design tool for a human factors specialist. It has been developed for designing the work-space of a crew for command, communications, and control activities at sit-stand duty. The first module in the MAWADES model is WOSTAS. Workstation Assessor (WOSTAS) accepts mission oriented task requirements, and using scheduling and line balancing concepts, generates alternate scheduling schemes of tasks to workstations. Then the WORG (Work-space Organizer) module generates ergonomically sound layouts of the workstations within the works-space. Workstations are laid out according to calculated link values between them. The third module is WOLAG (Workstation Layout Generator) which has been designed to generate panel layouts at each workstation. Displays and controls are laid out sequentially on a panel based on system functions and operational

relationships between panel components. An existing model, SAINT (System Analysis of Integrated Network of Tasks), is used for dynamic evaluation of suggested alternative designs. Other evaluation criteria (static) applied through the first three modules also help in the decision making process. GRA

N85-17555# SRI International Corp., Menlo Park, Calif.
SPATIOTEMPORAL CHARACTERISTICS OF VISUAL LOCALIZATION Annual Report, 30 Sep. 1983 - 29 Sep. 1984
C. A. Burbeck Jul. 1984 7 p
(Contract F49620-82-K-0024)
(AD-A148013; AFOSR-84-1068TR) Avail: NTIS HC A02/MF A01 CSCL 05/10

We continue to study the spatial and temporal characteristics of relative spatial localization, seeking to establish conditions in which it can be isolated from the processes underlying the detection of motion and form. Thus far we have found that stabilizing the retinal image degrades localization accuracy by a factor of 2, and further that this degradation does not result from a reduction in the apparent contrast of the stimulus. Drifting the stimulus slowly at a velocity known to restore contrast sensitivity to normal (unstabilized) values does not improve localization accuracy noticeably. However, localization accuracy is restored to normal if the otherwise-stabilized stimulus is moved rapidly. We have also found that localization accuracy improves with increasing contrast for contrasts significantly above the detection threshold, supporting our hypothesis that location and detection are parallel visual processes. We have also found that localization accuracy is as good at large object separations as it is at very small separations (the vernier acuity range where sensitivity is known to be extremely acute). Thus, spatial localization is not primarily a foveal function that is degraded elsewhere, but rather a general visual ability. GRA

N85-17556# Naval Health Research Center, San Diego, Calif.
COGNITIVE PERFORMANCE DURING SUCCESSIVE SUSTAINED PHYSICAL WORK EPISODES Interim Report
Carl E. Englund, David H. Ryman, Paul Naitoh, and James A. Hodgdon Jul. 1984 30 p
(AD-A148061; NAVHLTHRSCHC-84-31) Avail: NTIS HC A03/MF A01 CSCL 05/10

During times of emergency, e.g., military operations, humans must often work continuously for long hours at physically demanding tasks while remaining mentally alert. In this repeated measures study, eleven pairs (one experimental and one control) of Marines (N=22) experienced one 12-hour baseline and two 20-hour continuous work episodes (CWE). The 20-hour CWEs were separated by five hours which included a 3-hour nap from 0400-0700. Each hour of CWE was split into two half-hour sessions. During the first half-hour subjects performed alpha-numeric (A-N) visual vigilance tasks. The experimental member of each pair spent this first 30 minutes also walking on a treadmill in full combat gear (25 kg) at approximately 30 percent max V02 heart rate for a total distance of approximately 114 km. The controls performed the A-N task sitting quietly at a video terminal. During the second half-hour, all subjects performed selected combinations of computer generated tasks. The results indicated that the exercise of treadmill walking did not accentuate sleep loss effects on the cognitive measures studied. Sleep loss (day differences) was significant for the visual vigilance task (CWI = 80.9%, correct CW2 = 70.6%). GRA

N85-17557# Navy Experimental Diving Unit, Panama City, Fla.
OPERATING AND MAINTENANCE GUIDELINES FOR THE KINERGETICS (TRADE NAME) ENVIRONMENTAL CONTROL SYSTEM. CARBON DIOXIDE SCRUBBER MODEL DH-10 AND HEAT EXCHANGER MODEL CCU-01 Final Report
H. J. C. Schwartz May 1984 18 p
(AD-A148107; NEDU-14-84) Avail: NTIS HC A02/MF A01 CSCL 13/9

An environmental control system consisting of carbon dioxide scrubber model DH-10 and heat exchange model CCU-01 has previously been evaluated as suitable for installation in standard U.S. Navy two-lock aluminum recompression chambers. This report provides installation and operating guidelines and may be used as a basis for writing operating procedures for the two units. Manufacturer's instructions should be followed for installation. A method of measuring chamber carbon dioxide concentration, such as chemical detection tubes, must be used to determine when to change carbon dioxide absorbent canisters. For planning purposes, predicted canister durations for the scrubber under specified conditions of 3 occupants or less, 75 deg F (24 C) internal temperature, and no external ventilation or breathing apparatus overboard dump are 3.5 hours at 30 Feet of Sea Water (FSW), 1.5 hours at 60 FSW, and 1.0 hour at 165 FSW. The heat exchanger requires a minimum of 2 gallons per minute of water or water/propylene glycol mixture, chilled to a maximum temperature at the chamber ranging from 82 deg F (28 deg C) for an ambient air temperature of 86 deg F (30 deg C), to 36 deg F (2 deg C) for an ambient air temperature of 110 deg F (43 deg C), in order to keep the chamber internal temperature below 85 deg F (30 deg C). GRA

N85-17558# Naval Postgraduate School, Monterey, Calif.
DESIGN OF AN EVALUATION SYSTEM TO MEASURE PERFORMANCE DEGRADATION DUE TO CONTINUOUS OPERATIONS M.S. Thesis
M. G. ODonnell Mar. 1984 119 p
(AD-A148188) Avail: NTIS HC A06/MF A01 CSCL 05/10

This thesis establishes guidelines for an evaluation system designed to measure performance degradation due to continuous operations for battalion-sized units of the United States Army. It serves to initiate direction for the evaluation system, provides the framework on how to accomplish the necessary data measurements for such an evaluation, and enumerates the performance indicators to be measured. Techniques to analyze different types of data are provided, along with examples of the use of those techniques. A discussion of the uses of the analysis results is also presented. Author (GRA)

N85-17559# Duke Univ., Durham, N. C. Lab. for Environmental Research.
A THEORETICAL METHOD FOR SELECTING SPACE CRAFT AND SPACE SUIT ATMOSPHERES
Richard D. Vann and Jose R. Torre-Bueno 1984 25 p
(Contract N00014-83-K-0019)
(AD-A148219) Avail: NTIS HC A02/MF A01 CSCL 06/11

A theoretical method for selecting space craft and space suit atmospheres is described. The method assumes that gas bubbles cause decompression sickness and that the risk increases when a critical bubble volume is exceeded. The method is consistent with empirical decompression exposures for humans under conditions of nitrogen equilibrium between the lungs and tissues. Space station atmospheres are selected so that flight crews may decompress immediately from sea level to station pressure without preoxygenation. Bubbles form as a result of this decompression but are less than the critical volume. The bubbles are absorbed during an equilibrium period after which immediate transition to suit pressure is possible. Exercise after decompression and incomplete nitrogen equilibrium are shown to increase bubble size, and these factors limit the usefulness of one previously tested stage decompression procedure for the Shuttle. The method might be helpful for evaluating decompression procedures before testing. GRA

N85-17560# Navy Experimental Diving Unit, Panama City, Fla.
MANNED TESTING OF TWO CLOSED-CIRCUIT OXYGEN UNDERWATER BREATHING APPARATUS: US NAVY EMERSON RIG AND FENZY PO.68 Final Report
H. J. C. Schwartz Sep. 1984 22 p
(AD-A148300; NEDU-13-84) Avail: NTIS HC A02/MF A01 CSCL 06/11

The breathing characteristics of two types of closed circuit oxygen Self-Contained Underwater Breathing Apparatus (SCUBA), at a pressure equivalent to 30 feet of sea water were studied in the Ocean Simulation Facility of the Navy Experimental Diving

Unit. Breath-by-breath curves of inhaled and exhaled oxygen and carbon dioxide levels and inspiratory/expiratory pressure curves were recorded. For the first type, the U.S. Navy Recirculating Underwater Breathing Apparatus, Closed-Circuit, Oxygen (Emerson Rig), the carbon dioxide absorbent canister duration at 70 deg F (21 deg C) exceeded the arbitrary cutoff of 240 minutes with diver-subjects doing moderate work; at 40 deg F (4 deg C) the canister duration was 199 minutes. For the second type the Fenzy PO.68, the canister duration at 70 deg F (21 deg C) was 95 minutes, and no studies were done at 40 deg F. Both types were able to support divers doing hard work. Five cases of oxygen toxicity were seen, including three divers with mild symptoms, one with a near-convulsion, and one with a convulsion. GRA

N85-17561# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
DEVELOPMENT OF AN ELECTRO-PNEUMATIC ANTI-G VALVE FOR HIGH PERFORMANCE FIGHTER AIRCRAFT
R. E. VanPatten, T. J. Jennings, W. Albery, J. W. Frazier, and C. Goodyear 13 Dec. 1984 12 p Presented at the 1984 SAFE Symposium, Las Vegas, NV, 9-13 Dec. 1984
(AD-A148468; AFAMRL-TR-84-066) Avail: NTIS HC A02/MF A01 CSCL 06/17

A new concept for an anti-G suit valve was designed and built. The valve is designed specifically to protect aircrew from the unique physiological hazard of high onset rate, high sustained acceleration. The design is a hybridization of a conventional inertially operated valve and uses an electronically controlled solenoid to drive the anti-G suit pressure to the maximum when the level of acceleration exceeds both +2Gz and an onset rate of 2G/sec. After a 1.5 sec period the valve reverts to inertial operation unless the trigger criteria are fulfilled again. Relaxed tolerance of 15 human subjects was determined under high rate of onset centrifuge testing of the new valve (with and without ready pressure) versus the standard valve and a high flow ready pressure valve. The new concept provides a 1G improvement over the standard valve, and a 0.5 G improvement over the high flow ready pressure valve. On the basis of published data taken under similar conditions, the new valve appears to provide a 0.5 G improvement over all electronic servo valves. Pilot acceptance of this rapid acting concept has been favorable. GRA

N85-17562# Army Aeromedical Research Lab., Fort Rucker, Ala.
SPH-4 US ARMY FLIGHT HELMET PERFORMANCE, 1972 - 1983
T. E. Reading, J. L. Haley, Jr., A. C. Sippo, J. R. Licina, and A. W. Schopper Nov. 1984 49 p
(DA Proj. 3E1-62777-A-878)
(AD-A148674; USAARL-85-1) Avail: NTIS HC A03/MF A01 CSCL 06/17

Injury data was obtained from the US Army Safety Center for the occupants of US Army aircraft who were both wearing aviator helmets and involved in duty related aircraft accidents from the period beginning on 1 January 1972 and ending on 31 December 1982. The injury data was correlated with the physical condition of the helmets involved which has been obtained by the US Army Aeromedical Research Laboratory under the Aviation Life Support Equipment Retrieval Program. The helmet performance was evaluated with regard to current injury prevention capabilities and potential improvements for future helmet designs. For consistency, only the 208 SPH-4s in the data base were fully analyzed. An appendix contains a limited analysis of the APH-5s performance. It should be emphasized that no combat damaged helmets are discussed or analyzed in this report: i.e., no shrapnel or bullet damage is covered. GRA

N85-16894*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MAN-MACHINE INTERFACE AND CONTROL OF THE SHUTTLE DIGITAL FLIGHT SYSTEM
Richard D. Burghduff and James L. Lewis, Jr. *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 47-53 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 05H

N85-16897*# International Business Machines Corp., Cape Canaveral, Fla.
GROUND MAN-MACHINE INTERFACES FOR ORBITER CHECKOUT
F. Herb Blackmon *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 76-80 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 05H

N85-16921*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CHALLENGES OF DEVELOPING AN ELECTRO-OPTICAL SYSTEM FOR MEASURING MAN'S OPERATIONAL ENVELOPE
Barbara Woolford *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 426-434 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 05H

N85-16922*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CHALLENGES IN THE DEVELOPMENT OF THE SHUTTLE EXTRAVEHICULAR MOBILITY UNIT
Harold J. McMann and James W. McBarron, II *In its* Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 435-449 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 05H

N85-16923*# Hamilton Standard, Windsor Locks, Conn.
CHALLENGES IN THE DEVELOPMENT OF THE ORBITER ACTIVE THERMAL CONTROL SUBSYSTEM
John R. Nason, Frederic A. Wierum (Rice Univ., Houston, Tex.), and James L. Yanosy *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 450-464 refs (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 06K

N85-16924*# Rockwell International Corp., Downey, Calif.
OTHER CHALLENGES IN THE DEVELOPMENT OF THE ORBITER ENVIRONMENTAL CONTROL HARDWARE
John W. Gibb, M. E. McIntosh, Steven R. Heinrich (Fairchild Control Systems Co., Manhattan Beach, Calif.), Emory Thomas (Brunswick Corp., Costa Mesa, Calif.), Mike Steele (Brunswick Corp., Costa Mesa, Calif.), Franz Schubert (Life Systems, Inc., Cleveland, Ohio), E. P. Koszenski (Life Systems, Inc., Cleveland, Ohio), R. A. Wynveen (Life Systems, Inc., Cleveland, Ohio), R. W. Murray (General Electric Co., Valley Forge, Pa.), J. D. Schelkopf (General Electric Co., Valley Forge, Pa.) et al *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 465-479 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 06K

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N85-17563# Vicom Systems, Inc., San Jose, Calif.
VICOM TECHNICAL DESCRIPTION
Jun. 1984 40 p
(Rept-611-0012-Rev-A) Avail: NTIS HC A03/MF A01

An overview of the VICOM Digital Image Processor is presented. Both hardware and software tools are described.

N85-17564*# Louisville Univ., Ky. Dept. of Electrical Engineering.
PERFORMANCE MANAGEMENT SYSTEM ENHANCEMENT AND MAINTENANCE Final Report, Jan. - Nov. 1984
Thomas G. Cleaver, Ramin Ahour, and Billy R. Johnson Nov. 1984 86 p refs
(Contract NAS5-26504)
(NASA-CR-175271; NAS 1.26:175271) Avail: NTIS HC A05/MF A01 CSCL 09B

The research described in this report concludes a two-year effort to develop a Performance Management System (PMS) for the NCC computers. PMS provides semi-automated monthly reports to NASA and contractor management on the status and performance of the NCC computers in the TDRSS program. Throughout 1984, PMS was tested, debugged, extended, and enhanced. Regular PMS monthly reports were produced and distributed. PMS continues to operate at the NCC under control of Bendix Corp. personnel. Author

N85-17565# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
TOWARD A PRINCIPLE-BASED PARSER
G. E. Burton, Jr. Jul. 1984 49 p
(Contract N00014-80-C-0505)
(AD-A147637; AI-M-788) Avail: NTIS HC A03/MF A01 CSCL 05/7

Parser design lags behind linguistic theory. While modern transformational grammar has largely abandoned complex, language-specific rule systems in favor of modular subsystems of principles and parameters, the rule systems that underlie existing natural-language parsers are still large, detailed and complicated. The shift to modular theories in linguistics took place because of the scientific disadvantages of such rule systems. Those scientific ills translate into engineering maladies that make building natural-language systems difficult. The cure for these problems should be the same in parser design as it was in linguistic theory. The shift to modular theories of syntax should be replicated in parsing practice. Parser should base its actions on interacting modules of principles and parameters rather than a complex, monolithic rule system. If it can be successfully carried out, the shift will make it easier to build natural-language systems because it will shorten and simplify the language descriptions that are needed for parsing. It will also allow parser design to track new developments in linguistic theory. Author (GRA)

N85-17566# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
ADAPTING LOGISTICS MODELS TO A MICROCOMPUTER FOR INTERFACE WITH COMPUTER-AIDED DESIGN SYSTEMS M.S. Thesis
D. G. Davidson and J. J. Fraser Sep. 1984 206 p
(AD-A147666; AFIT/GLM/LSM/84S-11) Avail: NTIS HC A10/MF A01 CSCL 15/5

Currently, logistics models are run primarily on mainframe computers and at later stages of the design process. If logistics models were adapted to microcomputers, the models would be more accessible to the logistics engineers, thus resulting in products which are more reliable and more easily maintained. A further step would be to interface these models with a computer aided design (CAD) system. This thesis examines the difficulties of selecting models for incorporation into a CAD system and the use of microcomputers to run these models. A selection function was developed to identify models for specific types of analysis and their suitability for incorporation into a CAD system. The literature on microcomputers was examined to determine the limitations of microcomputers to run large logistics models. To further define these limitations the reliability maintainability cost model was adapted to an IBM-PC microcomputer. GRA

N85-17567# Carnegie-Mellon Univ., Pittsburgh, Pa. Electrical and Computer Engineering.
HYBRID DATA PROCESSING RESEARCH FACILITY Final Report, 1 Sep. 1983 - 31 Aug. 1984
D. Casasent Sep. 1984 6 p
(Grant AF-AFOSR-0357-83)
(AD-A148092; AFOSR-84-0886TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The equipment purchased on AFOSR-83-0357 for a hybrid data processing facility is detailed. Item 1 is a DeAnza image processor. It provides various simple processing functions. For our facility, it is used primarily as a real-time data display of image information (at present). This is vital for four AFOSR etc. image processing research. Items 2 and 3 are a printer and tape unit for our dedicated VAX processor. They are essential computer peripherals. Items 4 and 7 are associated system software items. Items 5 and 9 are terminals for our VAX. Item 5 are monitors for the image processor in Item 1. Item 10 allows multiple users on our VAX. Item 11 is a stand-alone real-time image processor we plan to develop. Item 12 are miscellaneous items for our computer system and Item 8 is a printer for text processing. GRA

N85-17568# Naval Postgraduate School, Monterey, Calif.
BENCHMARKING DATABASE SYSTEMS IN MULTIPLE BACKEND CONFIGURATIONS
S. A. Demurjian and D. K. Hsiao Nov. 1984 14 p
(RR0-0001)
(AD-A148191; NPS52-84-020) Avail: NTIS HC A02/MF A01 CSCL 09/2

The aim of this performance is twofold: (1) to devise benchmarking strategies for and apply benchmarking methodologies to the measurement of a prototype database system in multiple backend configurations, and (2) to verify the performance claims as projected or predicted by the designer and implementer of the multi-backend database system known as MBDS. Despite the limitation of the backend hardware, the benchmarking experiments have proceeded well, producing startling results and good insights. By collecting macroscopic data such as the response time of the request, the external performance measurements of MBDS have been conducted. The performance evaluation studies verify that: (1) when the database remains the same the response time of a request can be reduced to nearly half, if the number of backends and their disks is doubled; (2) when the response set of a request doubles, the response time of the query remains nearly constant, if the number of backends and their disks is doubled. These were the performance claims of MBDS as predicted by its designer and implementor. Author (GRA)

N85-17569# Naval Postgraduate School, Monterey, Calif.
IMPLEMENTATION OF AN INTEL 8086 MICROPROCESSOR-BASED REALIZATION LIBRARY FOR THE CONTROL SYSTEM DESIGN LANGUAGE M.S. Thesis
A. J. Cetel Jun. 1984 171 p
(AD-A148506) Avail: NTIS HC A08/MF A01 CSCL 09/2

A library for use by the computer aided design system, known as the Control System Design Environment, made up of hardware and software primitives of the Intel 8086 microprocessor family, was written to extend the capabilities of the design system to more than two microprocessor families. Compatibility between this library and the Intel 8086 library was desired and achieved by use of designs originally realized with the 8086 library. Author (GRA)

N85-17570# Department of the Navy, Washington, D. C.
A NONLINEAR TECHNIQUE FOR HIGH-RESOLUTION DATA PROCESSING Patent Application
R. A. Wagstaff and J. L. Berrou, inventors (to Navy) Filed 18 May 1984 31 p
(AD-D011415; US-Patent-Appl-SN-611811) Avail: NTIS HC A03/MF A01 CSCL 09/2

A nonlinear technique for high-resolution data processing produces high-resolution power spectra from the output of a conventional processor. First, a guess of the spectral estimate is formed. Then the spectral estimate is convolved with the system response function to produce estimated output levels. The differences between the estimated output levels and the measured output levels are used to modify the spectral estimate to produce a new guess. This process is repeated until certain criteria are satisfied. The present invention relates to data processing techniques, and more particularly to a nonlinear technique for high-resolution data processing to diminish the effect of system corruption. GRA

N85-17571# Department of the Air Force, Washington, D.C.
PROGRAMMABLE REALTIME INTERFACE BETWEEN A BLOCK FLOATING POINT PROCESSOR AND MEMORY Patent Application
T. M. King, inventor (to Air Force) Filed 24 Sep. 1984 18 p
(AD-D011431; US-Patent-Appl-SN-653641) Avail: NTIS HC A02/MF A01 CSCL 09/2

The programmable interface gives a Block Floating Point processor the capability of performing various real-time signal algorithms on collected radar data in an external batch memory. Normally, Block Floating Point processors are not capable of accomodating data having varying exponent scales such as the data received from a batch memory in a radar system. The programmable interface solves the exponential normalization process using two data paths, an instruction processor, a microscale processor, a pre-shift control and an address generator. Data flow instructions are passed from the instruction processor to the microcode processor which executes the particular instruction's timing sequence. The first data path passes data from the batch memory to the array processor and contains a pre-shifter to normalize the batch memory-stored data. The second data path passes the processed data from the processor to the batch memory. The pre-shifter portion of the first data path is controlled by a pre-shifter control section in the invention, which generates a 4-bit code used to command the pre-shifter. Finally, an address generator creates a sequence of fetch and store addresses for data travelling between the batch memory and the array processor. Author (GRA)

N85-17572# Naval Research Lab., Washington, D. C.
ON THE VALIDATION OF COMPUTER SCIENCE THEORIES
B. J. MacLennan Nov. 1984 18 p
(AD-A148637; NPS52-84-021) Avail: NTIS HC A02/MF A01 CSCL 09/2

We address normatively the demarcation problem for Computer Science: How can Computer Science research be conducted scientifically? First we attempt to delimit the subject matter of Computer Science, and conclude that it is not computers but programs. Since programs are not physical objects, it is difficult to see how they can be studied empircally. The rest of the paper is devoted to an explanation of how this can be done. This method is first illustrated by a hypothesis of narrow scope, analogous to a physical law. Next it is illustrated by a theory of wide scope - the Turing Machine model of computers. The approach is summarized in the conclusions. GRA

N85-16753# Research Triangle Inst., Research Triangle Park, N.C.
HARDWARE/SOFTWARE CODESIGN FOR MAINTAINABLE SYSTEMS
Geoffrey A. Frank *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 6 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-16754# Duisburg Univ. (West Germany). Dept. of Electrical Engineering.
DATA STIMULATED ON-LINE-CHECKING (IROLD)
M. Trautwein *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 9 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-16934*# Rockwell International Corp., Cocoa Beach, Fla.
MANAGING COMPUTER-CONTROLLED OPERATIONS
John B. Plowden *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 558-564 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 09B

N85-17187# Joint Publications Research Service, Arlington, Va.
ES DEVICES AT FAIR
Zoltan Szabo *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) 28 Dec. 1984 p 18-21 Transl. into ENGLISH from Szamitastech. (Budapest), no. 10, Oct. 1984 p 3 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

N85-17188# Joint Publications Research Service, Arlington, Va.
SPECIFICATIONS OF BLOC FLOPPY DISK DRIVES
Attila Kovacs, comp. *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) 28 Dec. 1984 p 22-23 Transl. into ENGLISH from Szamitastech. (Budapest), no. 10, Oct. 1984 p 5 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

N85-17189# Joint Publications Research Service, Arlington, Va.
MOM PERIPHERALS
Karoly Molnar *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) 28 Dec. 1984 p 25-30 Transl. into ENGLISH from Szamitastech. (Budapest), no. 10, Oct. 1984 p 1, 5 and 7 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

N85-17199# Joint Publications Research Service, Arlington, Va.
MICROPROCESSORS IN GEOPHYSICAL INSTRUMENTS DISCUSSED
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-043) 3 Dec. 1984 p 1 Transl. into ENGLISH from Rude Pravo (Prague), 12 Sep. 1984 p 4 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N85-17573 Purdue Univ., Lafayette, Ind.
EXTRACTION OF FEATURE INFORMATION FROM 3-DIMENSIONAL CAD DATA Ph.D. Thesis
Mark Richard Henderson 1984 153 p
Avail: Univ. Microfilms Order No. DA8423368

The future success of CAD and CAM depends on the ability of these two processes to communicate with each other and with the intermediate manufacturing database. The automatic linking of CAD and CAM involves a re-interpretation of the part database to extract manufacturing-specific semantic knowledge about the part. This knowledge can enable process planning and other CAM operations to proceed automatically without human guidance or intervention. A method was developed to extract semantic knowledge useful to manufacturing in the form of part features. The procedure consists of searching the part description, recognizing cavity features, extracting those features as solid volumes of

material to be removed and arranging them in a feature graph, a high level data structure more appropriate to manufacturing process planning. The feature recognition step uses logic programming implemented in PROLOG and expert system techniques. Using rules of logic, definitions were formulated to describe some common features of a part, such as holes and slots. Dissert. Abstr.

N85-17574 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
SOME EXPERIENCES OF TESTING PROTOCOL IMPLEMENTATIONS
J. R. Pavel and D. J. Dwyer (National Computing Centre Ltd.) Sep. 1984 24 p refs Sponsored by UK Dept. of Trade and Industry
(NPL-DITC-48/84; ISSN-0262-5369) Copyright. Avail: Issuing Activity

Open Systems Interconnection, protocols, and protocol test methods are introduced. Protocol testing with a variety of software tools is described. Common shortcomings in protocol implementations and difficulties with testing-systems are outlined. A testing system which takes these experiences into account is proposed. Author (ESA)

N85-17575*# George Washington Univ., Washington, D.C. Dept. of Operations Research.
COMPLETELY MONOTONE REGRESSION ESTIMATES OF SOFTWARE FAILURE RATES
Douglas R. Miller and Ariela Sofer 18 Jan. 1985 24 p refs (Grant NAG1-179)
(NASA-CR-174319; NAS 1.26:174319; GWU/IMSE/Serial-T-497/85) Avail: NTIS HC A02/MF A01 CSCL 09B

A method for estimating the present failure rate of a program is presented. A crude nonparameter estimate of the failure rate function is obtained from past failure times. This estimate is then smoothed by fitting a completely monotonic function, which is the solution of a quadratic programming problem. The value of the smoothed function at present time is used as the estimate of present failure rate. Results of a Monte Carlo study of performance are given. M.G.

N85-17576*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MINDS: A MICROCOMPUTER INTERACTIVE DATA SYSTEM FOR 8086-BASED CONTROLLERS
James F. Soeder Jan. 1985 41 p refs
(NASA-TP-2378; E-2172; NAS 1.60:2378) Avail: NTIS HC A03/MF A01 CSCL 09B

A microcomputer interactive data system (MINDS) software package for the 8086 family of microcomputers is described. To enhance program understandability and ease of code maintenance, the software is written in PL/M-86, Intel Corporation's high-level system implementation language. The MINDS software is intended to run in residence with real-time digital control software to provide displays of steady-state and transient data. In addition, the MINDS package provides classic monitor capabilities along with extended provisions for debugging an executing control system. The software uses the CP/M-86 operating system developed by Digital Research, Inc., to provide program load capabilities along with a uniform file structure for data and table storage. Finally, a library of input and output subroutines to be used with consoles equipped with PL/M-86 and assembly language is described. Author

N85-17577# Royal Signals and Radar Establishment, Malvern (England).
A FORTRAN PLOTTING PACKAGE FOR GRAPHIC VDUS
V. J. Mifsud and C. Broughton Aug. 1984 35 p
(AD-A148489; RSRE-MEMO-3739; BR93478) Avail: NTIS HC A03/MF A01 CSCL 09/2

A set of general plotting routines were implemented in FORTRAN on DEC LSI-11, PDP-11 and VAX-11 computers to provide a transportable graphics capability to improve data presentation and machine control of vector scan particle beam lithography machines. The routines are useful in scientific applications requiring compact and tailored graphics capabilities within specific programs. A user's guide for the suite is presented. Versions of the routines are available for ReGIS, Tektronics 4010/4014 and SIGMA native-mode graphics terminals. Author (ESA)

N85-17578# Boeing Aerospace Co., Seattle, Wash. Engineering Technology Div.
SOFTWARE TEST HANDBOOK: SOFTWARE TEST GUIDEBOOK, VOLUME 2 Final Report, Mar. 1982 - Sep. 1983
E. Presson Griffiss AFB, N.Y. RADC Mar. 1984 281 p
(Contract F30602-82-C-0059)
(AD-A147289; RADC-TR-84-53-Vol-2) Avail: NTIS HC A13/MF A01 CSCL 09/2

The purpose of the Software Test Handbook effort was to provide Air Force software developers with guidelines and methodology for the effective use of higher order language (HOL) software testing techniques and for the selection of automated tools for the testing of computer programs. The effort resulted in a two volume final technical report. Volume 1, the Final Technical Report, describes the total contractual effort. This report, Volume 2 - Software Test Guidebook, contains the guidelines and methodology resulting from the effort. In addition, it contains the following: (1) summary descriptions of the testing techniques, (2) an extensive bibliography, (3) typical paragraphs that can be included in software development Statements of Work (SOW) to specify the use of advanced software testing techniques by the contractor during the testing and verification phases of a contracted software development, and (4) a cross-reference to government and commercially available catalogs listing automated test tools that support the various testing techniques. Author (GRA)

N85-17579# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
A COMPUTER PACKAGE FOR RANKING, SELECTION AND MULTIPLE COMPARISONS WITH THE BEST
S. S. Gupta and J. C. Hsu Oct. 1984 10 p
(Contract N00014-84-C-0167)
(AD-A147617; TR-84-39) Avail: NTIS HC A02/MF A01 CSCL 09/2

RS-HCB is the simultaneous computer implementation of Ranking and Selection (RS) and Multiple Comparisons with the Best (MCB) procedures. This is made possible by recent developments in statistics which showed that Ranking and Selection (both Subset Selection and Indifference Zone) can be executed simultaneously with Multiple Comparisons with the Best without increasing the error rate of any component inference, for equal as well as unequal sample sizes. These developments are described, and the use of RS-MCB is illustrated with sample computer sessions. GRA

N85-17580# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN APPLICATION OF DISCRIMINANT ANALYSIS TO THE SELECTION OF SOFTWARE COST ESTIMATING MODELS M.S. Thesis
J. T. Steig Sep. 1984 97 p
(AD-A147632; AFIT/GSM/LSY/84S-26) Avail: NTIS HC A05/MF A01 CSCL 14/1

Currently, no quantitative methods exist to quantitatively select the best software cost estimating model for a particular software type or environment. By identifying the characteristics of the software that each model was best able to estimate, those characteristics could be used as a basis for predicting the best model. The analysis began by using selected models to concurrently estimate development costs for 25 known projects. Estimates from each model were compared and the most accurate model for each project was identified. The projects were assigned to the group of projects for which each model most accurately estimated development costs. After grouping each project, discriminant analysis was used to identify those input variables from all the estimating models that best discriminated between the groups. The identified input variables were then used as determinant

variables as a basis to predict which model was most likely to best estimate cost for each project. The unbiased prediction rate was 60%. Despite the high prediction rate, the overall estimating accuracy was not reduced. Results indicate that use of the pre-analysis determinants to select a model would not reduce estimating error more than a random selection of models. GRA

N85-17581# Naval Ocean Systems Center, San Diego, Calif.
KERNEL Ada PROGRAMMING SUPPORT ENVIRONMENT (KAPSE) INTERFACE TEAM PUBLIC REPORT, VOLUME 4 Interim Report, 1 Jul. 1983 - 30 Apr. 1984
P. Oberndorf 30 Apr. 1984 442 p
(AD-A147648; NOSC/TD-552-Vol-4) Avail: NTIS HC A19/MF A01 CSCL 09/2

The continuing activities of the Kernel Ada Programming Support Environments (KAPSE) interface team and its industry/academia auxiliary are reported. The Ada Joint Program Office (AJPO)-sponsored effort will ensure the interoperability and transportability of tools and data bases among different KAPSE implementations. The effort is the results of a Memorandum of Agreement (MOA) among the three services directing the establishment of an evaluation team, chaired by the Navy, to identify and establish KAPSE interface standards. As with previous ADA-related developments, the widest possible participation is being encouraged to create a broad base of experience and acceptance in industry, academia, and the DOD. This report is the fourth in a series that is being published by the KAPSE Interface Team (KIT). GRA

N85-17582# General Electric Co., Arlington, Va. Data and Information Systems.
APPROACHES TO STRUCTURING THE SOFTWARE DEVELOPMENT PROCESS Technical Report, 15 Jul. 1983 - 30 Sep. 1984
D. A. Boehm-Davis and L. S. Ross Oct. 1984 33 p
(Contract N00014-83-C-0574; RR0-4209)
(AD-A147694; GEC/DIS/TR-84-B1V-1) Avail: NTIS HC A03/MF A01 CSCL 09/2

This research examined program design methodologies, which claim to improve the design process by providing strategies to programmers for structuring solutions to computer problems. In this experiment professional programmers were provided with the specifications for each of three non trivial problems and asked to produce pseudo code for each specification according to the principles of a particular design methodology. The measures collected were the time to design and code, by several metrics. These data were used to develop profiles of the solutions produced by different methodologies and to develop comparisons between the methodologies. The results suggest that there are differences among the various methodologies. These differences are discussed in light of their impact on the comprehensibility, reliability, and maintainability of the programs produced. GRA

N85-17583# Naval Ship Research and Development Center, Bethesda, Md.
FUNDAMENTALS OF COMPUTER PROGRAMMING FOR ENGINEERS Final Report
P. N. Roth Oct. 1984 127 p
(AD-A147964; DTNSRDC-84/062) Avail: NTIS HC A07/MF A01 CSCL 05/9

This document teaches engineers how to write computer programs independent of any specific programming language. It shows the four principles of programming and how to use them to build computer programs in English. It shows how to translate the English programs into an appropriate engineering computer programming language: Pascal, FORTRAN77, FORTRAN66, or BASIC for instance. It also provides a programming checklist and a debugging guide. GRA

N85-17584# Rome Air Development Center, Griffiss AFB, N.Y. Intelligence and Reconnaissance Div.
MC68CRX CROSS-ASSEMBLER USERS MANUAL Status Report, May - Aug. 1984
Ken D. Romano Sep. 1984 88 p
(AF Proj. 4594)
(AD-A148031; RADC-TM-84-19) Avail: NTIS HC A05/MF A01 CSCL 09/2

This in-house report is a technical user's manual containing all the information needed to utilize a FORTRAN Cross-Assembler (MC68CRX) for the Motorola MC68000 microprocessor. The Cross-Assembler was developed in-house at RADC (IRAP). A program listing (FORTRAN 77) is also included, along with information concerning hardware connections from the MC-68000 to a DEC mainframe computer. This manual describes the MC68CRX cross-assembler and a FORTRAN transfer program, which were developed to facilitate programming of the Motorola MC68000 microprocessor, and development of MC68000 based systems. Both programs are written in FORTRAN 77, which allows the user to utilize the features of a mainframe computer, such as the DEC 11/70 or DEC 11/45. The cross-assembler translates MC68000 assembly language code into machine language. The transfer program downloads the machine code to the MC68000. GRA

N85-17585# Imperial Coll. of Science and Technology, London (England).
MULTIDIMENSIONAL DIGITAL SIGNAL PROCESSING Final Technical Report
T. A. Lanfear and A. G. Constantinides Aug. 1984 21 p
(Contract DAJA45-84-C-0025)
(AD-A148055) Avail: NTIS HC A02/MF A01 CSCL 09/2

This project has been concerned with the development of software tools for the study, at the most general level, of the ALPS system architecture. The primary aim to these tools is to answer such questions as: is a signal processing application feasible with a given hardware configuration?; will the system degrade gracefully if some the the resources fail?; what is the effect on system performance of changes to details such as the number of resources available, the execution time of a resource etc., etc? A program has been written in FORTRAN 77 which simulates the ALPS Signal Flow Architecture. It takes the following information into consideration: (1) The signal processing application expressed as a signal flow graph with modifications; (2) The number and types of resources in the system; (3) The execution time of the resources; (4) The type of resource associated with each graph mode; (5) The number of data busses and their data transfer rates; and (6) The rate at which data is presented to the input of the system. GRA

N85-17586# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
THE DESCRIPTION OF LARGE SYSTEMS
K. Pitman Sep. 1984 35 p
(Contract N00014-80-C-0505; Grants NSF MCS-79-12179; NSF MCS-81-17633)
(AD-A148072; AI-M-801) Avail: NTIS HC A03/MF A01 CSCL 09/2

In this paper, we discuss the problems associated with the description and manipulation of large systems when their sources are not maintained as single files. We show why and how tools that address these issues, such as Unix MAKE and Lisp Machine DEFSYSTEM, have evolved. Existing formalisms suffer from the problem that their syntax is not easily separable from their functionality. In programming languages, standard calling conventions exist to insulate the caller of a function from the syntactic details of how that function was defined, but until now no such conventions have existed to hide consumers of program systems from the details of how those systems were specified. We propose a low-level data abstraction which can support notations such as those used by MAKE and DEFSYSTEM without requiring that the introduction of a new notation be accompanied by a completely different set of tools for instantiating or otherwise manipulating the resulting system. GRA

N85-17587# Florida Univ., Gainesville. Dept. of Industrial and Systems Engineering.

DEVELOPING DOUBLE SAMPLING PLANS FOR ATTRIBUTES TO MEET SAMPLE SIZE CRITERIA
R. W. Rangarajan, K. B. Beitler, and R. S. Leavenworth Sep. 1984 46 p
(Contract N00014-75-C-0783)
(AD-A148144; RR-84-32) Avail: NTIS HC A03/MF A01 CSCL 09/2

This study reports on the development of a FORTRAN IV program to produce double sampling acceptance plans for attributes data. The plans must satisfy two points on an operating characteristic curve, the acceptable quality level point (p1, 1-alpha) and the rejectable quality level (p2, beta). Two models are given. Model 1 has an additional constraint that the maximum value of the ASN must be less than or equal to the sample size for a corresponding single sampling plan. Model 2 relieves this constraint. In either case, the resulting plan has a minimum ASN evaluated at the quality level p1 among all sampling plans satisfying the constraints. Author (GRA)

N85-17588# Naval Postgraduate School, Monterey, Calif.
COPES/ADS (CONTROL PROGRAM FOR ENGINEERING SYNTHESIS) (AUTOMATED DESIGN SYNTHESIS) USING THE ADS OPTIMIZATION PROGRAM
Garrett N. Vanderplaats Jun. 1984 82 p
(AD-A148576; NPS69-84-009) Avail: NTIS HC A05/MF A01 CSCL 09/2

A FORTRAN COntrol Program for Engineering Synthesis (COPES) is presented for solving engineering design problems. This program uses the general-purpose optimization code ADS (Automated Design Synthesis) to provide a versatile design optimization capability. The program minimizes or maximizes a numerically defined objective function subject to a set of constraint limits. In addition to direct optimization, COPES includes approximation techniques as well as the capability to perform conventional parametric studies. Programming guidelines are presented, followed by sample input data and output for the various program options. Author (GRA)

N85-17589# Naval Ship Research and Development Center, Bethesda, Md. Computation Mathematics-Logistics Dept.
COMPUTER CENTER CDC LIBRARIES-PROCFIL (PROCEDURES) Final Report
D. V. Sommer Jun. 1984 204 p
(AD-A148633; DTNSRDC/CMLD-84-13) Avail: NTIS HC A10/MF A01 CSCL 09/2

This reference manual describes all of the catalogued procedures (sets of control cards to accomplish a task) in Library PROCFIL on the CDC CYBER 170 computers at DTNSRDC. These procedures include document/source program/procedure file maintenance, program compilation/loading/execution, permanent file audit/rename copy functions. Clip/P lists the procedures by functional category and alphabetically with a descriptive title all machine-readable documents detailing the use of these procedures are included. Author (GRA)

N85-17590# Naval Postgraduate School, Monterey, Calif.
STEPS TOWARDS PARSING OF QUERY SEQUENCES TO A DATABASE
N. C. Rowe Oct. 1984 17 p
(AD-A148769; AD-E301534; NPS52-84-015) Avail: NTIS HC A02/MF A01 CSCL 09/2

Sequences of queries to a database system can have structure. Recognizing this structure is a kind of parsing , analogous to the parsing of sentences. We present two rather different approaches to recognition for exploitation. The first is a rule-based system that examines superficial aspects of a query sequence to postulate preferences between sets mentioned in the queries. The second is a deeper, but more limited model based on decision theory, which assigns utilities and suitability probabilities to individual set items, and attempts to explain set preferences on that basis. Both of these methods have disadvantages, and their performance is difficult to analyze because of the fuzzy nature of the application, but it is hoped they can form the basis for more comprehensive man-machine interfaces. GRA

N85-17591# University of Southern California, Los Angeles. Dept. of Electrical Engineering.
THE ALGEBRAIC STRUCTURE OF CONVOLUTIONAL CODES WITH APPLICATION TO CODE CONSTRUCTION AND DECODING Quarterly Interim Report, 7 Jan. - 30 Sep. 1984
I. S. Reed Oct. 1984 22 p
(Contract F49620-84-C-0069)
(AD-A148770; AD-E301534) Avail: NTIS HC A02/MF A01 CSCL 12/1

During this quarter, the error trellis syndrome decoding techniques for convolutional codes was developed. This algorithm is specialized then to the entire class of systematic convolutional codes. Finally, this algorithm is applied to the high rate Wyner-Ash convolutional codes. A special example of the one-error-correcting Wyner-Ash code, a 3/4 rate code is treated in this report. Author (GRA)

N85-17592# Institute for Defense Analyses, Alexandria, Va.
CONCEPT PAPER FOR THE DEVELOPMENT OF A DOD Ada (TRADEMARK) SOFTWARE ENGINEERING EDUCATION AND TRAINING PLAN Final Report
P. R. Jordan, C. W. McDonald, and B. Schaar Nov. 1984 26 p
(Contract MDA903-84-C-0031)
(AD-A148774; AD-E500686; IDA-M-7; IDA/HQ-84-28940) Avail: NTIS HC A03/MF A01 CSCL 09/2

The Ada Joint Program Office (AJPO) was established in December 1980, to manage the Department of Defense (DOD) efforts to implement, introduce, and provide life-cycle support for Ada. As part of this charter, it is the role of the AJPO to address Ada education and training. The goal of this document is to set forth the concepts necessary for Ada software engineering education and training. These concepts will result in an effective use of Ada in the shortest time possible to realize cost savings and achieve reliability and adaptability in computer software development. The full potential of Ada cannot be realized without appropriate education and training. GRA

N85-17593# Naval Ship Research and Development Center, Bethesda, Md. Computation Mathematics/Logistics Dept.
COMPUTER CENTER CDC LIBRARIES/NSRD (SUBPROGRAMS) Final Report
D. V. Sommer and S. E. Good Jun. 1984 423 p
(AD-A148792; DTNSRDC/CMLD-84-12) Avail: NTIS HC A18/MF A01 CSCL 09/2

This document is a reference manual which describes most of the subprograms in libraries NSRDC and NSRDC5 on the CDC Cyber 170 computers at DTNSRDC. These scientific and utility routines are used primarily with FORTRAN programs and most are written in FORTRAN. CLIB/N lists the routines by functional category and alphabetically with a descriptive title. All available machine-readable documents detailing the use of these routines are included. GRA

N85-17594# Argonne National Lab., Ill.
GUIDE TO PERSONAL DESKTOP COMPUTING AT ANL
Debbie Coultis, Marc Gallo, Ewing Lusk, Fred Moszur, and Clifford Caruthers, ed. Sep. 1984 107 p refs
(Contract W-31-109-eng)
(DE85-001438; ANL/TM-404-Rev) Avail: NTIS HC A06/MF A01

Personal desktop computers are discussed in general and in the context of the larger scheme of computing tools and services at the Argonne National Laboratory. Updated information and recommendations to assist users in meeting their computing needs are provided. Services for personal desktop computer users at Argonne and technological changes in personal desktop computer hardware and software since the original publication of this document in April 1983 are outlined. DOE

N85-17595# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung

fuer Meteorologische Modelle.

THREE-DIMENSIONAL, DIRECT AND VECTORIZED ELLIPTIC SOLVERS FOR VARIOUS BOUNDARY CONDITIONS

Helmut Schmidt, Ulrich Schumann, Hans Volkert, and Wolfgang Ulrich (Technische Univ., Munich) Jul. 1984 111 p refs (AD-B088266L; DFVLR-Mitt-84-15) Avail: NTIS HC A06/MF A01; DFVLR, Cologne DM 30

Three subprograms for solving the three-dimensional Helmholtz equation with respect to Cartesian coordinates in a cubic domain are introduced. It is assumed that this elliptic partial differential equation is discretized by second order finite differences on a regular staggered grid. Different methods are employed depending on boundary conditions. Neumann, Dirichlet, periodic and shear-periodic boundary conditions are provided in various combinations. The subroutines are coded in FORTRAN-77 and organized such that they can be evaluated in vectorized form on a vector computer like the CRAY-1. Author (ESA)

N85-16744# Toronto Univ. (Ontario).

THE PRODUCTION OF MAINTAINABLE, TRUSTWORTHY, AND PORTABLE SOFTWARE

E. Stewart Lee and Richard C. Holt *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 10 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-16746# Pacific Missile Test Center, Point Mugu, Calif. Electronic Warfare Computer Resources Div.

EFFECTIVE LIFE CYCLE SOFTWARE SUPPORT: A STUDY IN DISCIPLINE AND VERSATIILITY

George H. Smith *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 7 p (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-16747# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).

EXPERIENCE IN USING ON-AIRCRAFT SOFTWARE FOR TESTING INTEGRATED SYSTEMS

K. Numberger *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 20 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-16748# California Univ., Irvine. Dept. of Information and Computer Science.

SOFTWARE TESTING IN AN ADA PROGRAMMING ENVIRONMENT

Richard N. Taylor *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 12 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-16749# International Business Machines Corp., Research Triangle Park, N.C.

INVESTIGATING VERSION DEPENDENCE IN FAULT-TOLERANT SOFTWARE

R. Keith Scott, James W. Gault (ARO, Research Triangle Park, N.C.), David F. McAllister (North Carolina State Univ., Raleigh), and Jeffery Wiggs (North Carolina State Univ., Raleigh) *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 11 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-16750# Dowty Electronics Ltd., London (England). Controls Div.

THE EFFECT ON SOFTWARE DESIGN OF TESTING BY SYMBOLIC EXECUTION

D. A. Rutherford and F. Lam *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 5 p (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-16751# LABEN Space Instrumentation and Systems, Milan (Italy).

RELIABLE SOFTWARE DESIGN FOR AVIONICS AND SPACE APPLICATIONS

P. Donzelli and G. Giannini *In* AGARD Design for Tactical Avionics Maintainability Oct. 1984 11 p refs (For primary document see N85-16731 08-01)
Avail: NTIS HC A13/MF A01

N85-16932*# Martin Marietta Corp., Cocoa Beach, Fla.

AUTOMATIC SOFTWARE FOR CONTROLLING CRYOGENIC SYSTEMS

James W. Rudolph *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 Jan. 1985 p 539-549 (For primary document see N85-16889 08-12)
Avail: NTIS HC A25/MF A01 CSCL 09B

N85-16973*# Planning Research Corp., Kennedy Space Center, Fla.

COMPUTER AIDED PROCESSING USING LASER MEASUREMENTS

Richard M. Davis and John C. Koch *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 2 Jan. 1985 p 986-994 (For primary document see N85-16937 08-12)
Avail: NTIS HC A23/MF A01 CSCL 09B

N85-17180# Joint Publications Research Service, Arlington, Va.

FAST ARITHMETIC FOR MICROCOMPUTERS

Frank Markert *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) 26 Dec. 1984 p 35 refs Transl. into ENGLISH from Radio Fernsehen Elektron. (East Berlin), v. 32, no. 8, 1983 p 487-490 (For primary document see N85-17176 08-31)
Avail: NTIS HC A03/MF A01

N85-17186# Joint Publications Research Service, Arlington, Va.

FLEXIBLE MANUFACTURING SYSTEM CONCEPT FEATURES CACHE MEMORY Abstract Only

Gerhard Stehfest *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) 28 Dec. 1984 p 12 Transl. into ENGLISH from Freiheit (Halle), 19 Oct. 1984 p 8 (For primary document see N85-17183 08-31)
Avail: NTIS HC A04/MF A01

N85-17194# Joint Publications Research Service, Arlington, Va.

DESCRIPTION OF MBB COMPUTERIZED DESIGN TECHNIQUES FOR A320

In its West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 7-9 Transl. into ENGLISH from VDI Nachr. (Dusseldorf), 28 Sep. 1984 p 26 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

N85-17203# Joint Publications Research Service, Arlington, Va.

EDP COMPUTER TAPES DESCRIBED

In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-043) 3 Dec. 1984 p 22-25 Transl. into ENGLISH from DDR Export (East Berlin), no. 14, 1984 p 12-14 (For primary document see N85-17198 08-31)
Avail: NTIS HC A04/MF A01

N85-17254*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

DATA USER'S MANUAL

In its The SIR-B Sci. Invest. Plan 1 Jul. 1984 7 p ref (For primary document see N85-17208 08-32)
Avail: NTIS HC A10/MF A01 CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks.

N85-17596*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

OPERATING SYSTEM FOR A REAL-TIME MULTIPROCESSOR PROPULSION SYSTEM SIMULATOR. USER'S MANUAL
Gary L. Cole Jan. 1985 42 p refs
(NASA-TP-2426; D-1998; NAS 1.60:2426) Avail: NTIS HC A03/MF A01 CSCL 09B

The NASA Lewis Research Center is developing and evaluating experimental hardware and software systems to help meet future needs for real-time, high-fidelity simulations of air-breathing propulsion systems. Specifically, the real-time multiprocessor simulator project focuses on the use of multiple microprocessors to achieve the required computing speed and accuracy at relatively low cost. Operating systems for such hardware configurations are generally not available. A real time multiprocessor operating system (RTMPOS) that supports a variety of multiprocessor configurations was developed at Lewis. With some modification, RTMPOS can also support various microprocessors. RTMPOS, by means of menus and prompts, provides the user with a versatile, user-friendly environment for interactively loading, running, and obtaining results from a multiprocessor-based simulator. The menu functions are described and an example simulation session is included to demonstrate the steps required to go from the simulation loading phase to the execution phase. R.S.F.

N85-17597# University of Southern California, Marina del Rey. Information Sciences Inst.
EGP (EXTERIOR GATEWAY PROTOCOL) GATEWAY UNDER BERKELEY UNIX 4.2
Paul Kirton Oct. 1984 42 p
(Contract MDA903-81-C-0335)
(AD-A148056; ISI/RR-84-145) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report describes an implementation of the Exterior Gateway Protocol that runs under the UNIX 4.2 BSD operating system. Some issues related to local network configurations are also discussed. The Exterior Gateway Protocol has been specified to allow autonomous development of different gateway systems while still maintaining global distribution of internet routing information. EGP provides a means for different autonomous gateway systems to exchange information about the networks that are reachable via them. GRA

N85-17598# California Univ., Los Angeles. School of Engineering and Applied Science.
PERFORMANCE EVALUATION AND CONTROL OF DISTRIBUTED COMPUTER COMMUNICATION NETWORKS Annual Report, 30 Jun. 1983 - 29 Jun. 1984
I. Rubin and M. Gerla Sep. 1984 39 p
(Grant AF-AFOSR-0304-82)
(AD-A148103; UCLA-ENG-84-33; AFOSR-84-0988TR) Avail: NTIS HC A03/MF A01 CSCL 05/1

During the 1982-1984 performance-period under this AFOSR Grant, we have carried out research investigations and obtained many significant results, of both theoretical and practical importance. A large multitude of computer communication network architectures, models and control schemes have been developed, analyzed and evaluated. In particular, results have been obtained in the following areas: priority-based TDMA schemes; dynamic random-access procedures, with applications to local area networks, metropolitan-area networks and packet-radio networks; hybrid multiple-access schemes; polling, adaptive polling and probing access-control techniques; buffer capacity constrained multi-access systems; network topological analysis; polling networks under unbalanced traffic conditions; performance of token-ring and token-bus local area networks; terminal-priority based contentionless access-control algorithms; queueing and telecommunication systems subject to traffic activity mode changes; local area network architectures and protocols for the integration of data/voice/video; integrated packet and circuit switched networks; integrated routing and flow control algorithms in computer networks. Author (GRA)

N85-17599# Duke Univ., Durham, N. C. Dept. of Computer Science.
ON MODELING THE PERFORMANCE AND RELIABILITY OF MULTI-MODE COMPUTER SYSTEMS
V. G. Kulkarni, V. F. Nicola, and K. S. Trivedi Nov. 1984 23 p
(Contract DAAG29-84-K-0045; Grants AF-AFOSR-0132-84; AF-AFOSR-0140-84; NSF MCS-83-0200)
(AD-A148444; CS-1984-6; AFOSR-84-1098TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The authors present an effective technique for the combined performance and reliability analysis of multi-mode computer systems. A reward rate (or a performance level) is associated with each mode of operation. The switching between different modes is characterized by a continuous time Markov chain. Different types of service-interruption interactions (as a result of mode switching) are considered. The authors consider the execution time of a given job on such a system and derive the distribution of its completion time. A useful dual relationship, between the completion time of a given job and the accumulated reward up to a given time, is noted. The authors demonstrate the use of their technique by means of a simple example. Author (GRA)

N85-17600# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
ASYNCHRONOUS DISTRIBUTED FLOW CONTROL ALGORITHMS Ph.D. Thesis
J. Mosely Oct. 1984 199 p
(Contract N00014-84-K-0357; Grant NSF ECS-83-10698)
(AD-A148452; LIDS-TH-1415) Avail: NTIS HC A09/MF A01 CSCL 09/2

This document considers algorithms for flow control in computer networks with fixed routing. The goal is to establish input rates, for each source-destination pair, that satisfy a particular fairness criterion. Described are several algorithms in which the input rates are calculated based on controls established by the links of the network. These controls are updated iteratively, using feedback information from the network. It is shown that the rates thus calculated converge to the desired values when the links are assumed to update synchronously, and without feedback delay. A model for asynchronous operation with delay is given, and we demonstrate for this model that the input rates calculated by the synchronous algorithms may fail to converge. We show how to modify the algorithms, by the introduction of an update protocol and by using more of the available feedback information, so that convergence of the rates is guaranteed. The author extends the model for asynchronous computation developed by Bertsekas to get some results relating to general asynchronous distributed algorithms with update protocols. These results are used to give an alternate proof of the correct operation of one of the flow control algorithms. A computer program is developed to simulate the flow control algorithms for a voice packet network. The simulation results indicate that the algorithms behave as expected for a network with static loads. However, when input loads change in imitation of real conversations, the control algorithms do not adapt fast enough to control the flows effectively. Author (GRA)

N85-17601# Software Architecture and Engineering, Inc., Arlington, Va.
A UNIFIED MODEL FOR PERFORMANCE AND RELIABILITY OF FAULT-TOLERANT/MULTI-MODE SYSTEMS
V. G. Kulkarni, V. F. Nicola, and K. S. Trivedi Nov. 1984 35 p
(Contract DAAG29-84-C-0045; Grant AF-AFOSR-0132-84)
(AD-A148789; CS-1984-12; AFOSR-84-1094TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper unifies different models and relates different performance and reliability measures that have been proposed for the analysis of fault-tolerant computer systems. We model the changes in the structure of the system due to different events (such as degradation, failure or repair) as a continuous time Markov chain. In particular, we consider the execution of a job on such a computer system where a service rate (or a reward rate) is associated with each structure-state. We allow different types of

service-preemption interactions due to changes in the structure-state of the system. We derive the distribution of the completion time of a given job. Although the developed techniques are suitable for the analysis of complex systems, we demonstrate their use through a simple switching server example. GRA

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N85-17602 Oxford Univ. (England). Dept. of Engineering Science.
BIBLIOGRAPHY OF ADAPTIVE CONTROL
D. W. Clarke 1984 38 p
(OUEL-1544/84) Avail: Issuing Activity
Over 500 references on adaptive control are listed herein.
Author (ESA)

N85-17603*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
RESEARCH ON OPTIMAL CONTROL, STABILIZATION AND COMPUTATIONAL ALGORITHMS FOR AEROSPACE APPLICATIONS Final Report, 1966 - 1984
Michael Athans Oct. 1984 64 p refs
(Grant NGL-22-009-124)
(NASA-CR-174318; NAS 1.26:174318; LIDS-FR-1418; MIT-OSP-76265) Avail: NTIS HC A04/MF A01 CSCL 09B
The research carried out in the areas of optimal control and estimation theory and its applications under this grant is reviewed. A listing of the 257 publications that document the research results is presented. R.S.F.

N85-17604# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
ON THE GLOBAL ASYMPTOTIC STABILIZATION OF NONLINEAR SYSTEMS
Franziska Eibenstein, Johannes Jahn, and George Leitmann Jul. 1984 12 p refs
(Preprint-838) Avail: NTIS HC A02/MF A01
Controls for which the zero solutions of a system of differential equations (where the state appears nonlinearly and the control appears linearly) become globally asymptotically stable are presented. This stabilization problem is also investigated in the presence of parameter uncertainties. Author (ESA)

N85-17605# Oxford Univ. (England). Dept. of Engineering Science.
OPTIMAL STOCHASTIC LQ CONTROL WITH MEASUREMENTS DISPLACED IN TIME
R. Gessing (Silesian Technical Univ., Poland) and O. Jacobs 1984 13 p refs
(OUEL-1547/84) Avail: NTIS HC A02/MF A01
Linear stochastic systems which have nonstandard information in the form of time-shifted measurements are discussed. The systems are subject to disturbances in the form of Markov processes. Measurements of states and of disturbances are included; either may be delayed in time, and measurements of disturbances can be advanced in time. Measurement delays may be uniform over a whole vector or may vary from one element to another. State augmentation is used to give classical representations such that optimal control is determined by the certainty equivalence principle. Augmented state vectors and matrices are stated. Author (ESA)

N85-17606# Sheffield Univ. (England). Dept. of Control Engineering.
IMPROVED STABILITY AND PERFORMANCE BOUNDS USING APPROXIMATE MODELS
D. H. Owens and A. Chotai May 1984 24 p refs Presented at 4th IMA Conf. on Control Theory, Cambridge, England, Sep. 1984
(Grant SERC-GR/B/23250)
(RR-260) Avail: NTIS HC A02/MF A01
Multivariable feedback control design for a m-output/l-input stable linear system (G) based on a simplified stable approximate or reduced-order model (GA) is discussed. Where a forward path controller is designed to produce acceptable stability and performance characteristics from GA in the presence of linear measurement dynamics, use of information on the step response characteristics of G to predict the stability and performance characteristics of the closed-loop system is considered. Results show that design procedures using approximate models can be improved in the frequency domain and time domain by simulation-based data processing using filters and the use of exponentially weighted L-infinity spaces in the underlying fixed point problem.
Author (ESA)

N85-17607# Sheffield Univ. (England). Dept. of Control Engineering.
THE PRACTICAL IDENTIFICATION OF SYSTEMS WITH NONLINEARITIES
S. A. Billings and M. B. Fadzil Aug. 1984 24 p refs Presented at 7th IFAC Symp. on Identification and System Parameter Estimation, New York, 1985
(Grant SERC-GR/B/31163)
(RR-264) Avail: NTIS HC A02/MF A01
The practical aspects of identifying nonlinear systems are discussed using the identification of a heat exchanger. Methods of determining if the system is linear or nonlinear prior to parameter estimation are illustrated. Techniques for estimating the unknown parameters in a nonlinear difference equation model are discussed and the application of model validity tests which detect the existence of unmodeled linear or nonlinear terms in the residuals are demonstrated. Author (ESA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N85-17608 City Univ. of New York, N. Y.
CLOSURE PROBLEM AND NUMERICAL STUDIES OF TURBULENCE Ph.D. Thesis
Qian Jian 1984 93 p
Avail: Univ. Microfilms Order No. DA8423068
A variational approach is proposed to solve the closure problem of turbulence theory and to derive the Kolmogorov law in an Eulerian framework. Two convergent integral equations are obtained for two unknown functions. The Kolmogorov constant Ko is evaluated numerically, obtaining Ko - 1.2, which is compatible with the experimental data. The initial-value problem of a forced Burgers equation is numerically solved by the Fourier expansion method. It is found that its solutions finally reach a steady state of laminar flow which has no randomness and is stable to disturbances. Hence, strictly speaking, the so-called Burgers turbulence is not a turbulence. A one-dimensional model of turbulence is proposed to simulate the Navier-Stokes turbulence. A series of numerical experiments on this one-dimensional turbulence are made and successful in obtaining Kolmogorov's k(-5/3) inertial-range spectrum. The (one-dimensional) Kolmogorov constant ranges from 0.5 to 0.65. Finally the variation approach is applied to the one-dimensional model of turbulence proposed.
Dissert. Abstr.

N85-17609*# National Aeronautics and Space Administration, Washington, D. C.
ALGORITHM FOR SPACE-TIME ANALYSIS OF DATA ON GEOMAGNETIC FIELD
N. V. Kulanin, V. P. Golokov, ed., and S. Tyupkin, ed. Nov. 1984 27 p refs Transl. into ENGLISH from the book "Algorithy i Rezultaty Obrabotki Dannykh v MTsC" Moscow, 1978 p 1-5, 44-54 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

Original doc. prep. by Geophysical Committee, Academy of Sciences (USSR), Moscow
(Contract NASw-4005)
(NASA-TM-77804; NAS 1.15:77804) Avail: NTIS HC A03/MF A01 CSCL 12A

The algorithm for the execution of the space-time analysis of data on geomagnetic fields is described. The primary constraints figuring in the specific realization of the algorithm on a computer stem exclusively from the limited possibilities of the computer involved. It is realized in the form of a program for the BESM-6 computer. B.W.

N85-17610# Florida State Univ., Tallahassee. Dept. of Statistics.
LARGE DEVIATIONS FOR PROCESSES WITH INDEPENDENT INCREMENTS
J. Lynch and J. Sethuraman 1 Oct. 1984 36 p
(Contracts DAAG29-84-K-0007; DAAG29-82-K-0168)
(AD-A147293; FSU-STATISTICS-M687; TR-D-71-ARO; ARO-19367.19-MA; ARO-20063.2-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

The establishment of the large deviation principle (LDP) has had important implications in various areas in statistics. It has been used to obtain the asymptotic efficiencies of tests and estimates and to obtain the asymptotic behavior of functional integrals associated with solutions of stochastic integrals. It appears in the evaluation of the free energy in statistical mechanics. It is also intimately related to certain types of laws of large numbers. This paper studies the LDP for a stochastic process with stationary independent increments with no Gaussian component and obtain complete results. GRA

N85-17611# Wisconsin Univ., Madison. Mathematics Research Center.
REGULARITY OF THE FREE BOUNDARY FOR THE POROUS MEDIUM EQUATION Technical Summary Report
K. Hoellig and M. Pilant Sep. 1984 21 p
(Contract DAAG29-80-C-0041; Grant NSF DMS-83-51187)
(AD-A147299; MRC-TSR-2742) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document discusses equations which describe the expansion of a gas in a one dimensional porous medium. GRA

N85-17612# Wisconsin Univ., Madison. Mathematics Research Center.
AN INVARIANT MEASURE FOR THE EQUATION u SUB tt - u SUB xx + u3 = O Technical Summary Report
L. Friedlander Aug. 1984 24 p
(Contract DAAG29-80-C-0041)
(AD-A147300; MRC-TSR-2736) Avail: NTIS HC A02/MF A01 CSCL 12/1

Numerical studies of the initial boundary-value problem for a semilinear wave equation subject to certain periodic boundary conditions and initial conditions suggest that solutions ultimately return to a neighborhood of the initial state after undergoing a possibly chaotic evolution. This paper considers an appropriate abstract space. In this space a finite measure is constructed. This measure is invariant under the flow generated by the Hamiltonian system which corresponds to the original equation. This enables one to verify the above returning property. GRA

N85-17613# Technion - Israel Inst. of Tech., Haifa. Faculty of Industrial and Mangement Engineering.
TAIL BEHAVIOUR FOR SUPREMA OF EMPIRICAL PROCESSES Technical Report
R. J. Adler and L. D. Brown Sep. 1984 54 p
(Grant AF-AFOSR-0068-83)
(AD-A147629; AFOSR-84-0937TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

This document considers multi-variate empirical processes with an empirical distribution function based on i.i.d. variables with certain distribution functions. GRA

N85-17614# Chicago Univ., Ill. Center for Decision Research.
PROBABLE CAUSE: A DECISION MAKING FRAMEWORK
H. J. Einhorn and R. M. Hogarth Aug. 1984 78 p
(Contract N00014-84-C-0018)
(AD-A147642; Rept-9) Avail: NTIS HC A05/MF A01 CSCL 12/1

Causal inference is an essential cognitive activity that combines judgments of causation with judgments of probable cause. A framework for understanding how judgments of probable cause are made is presented that consists of three major elements: (1) The authors first discuss the concept of a causal background and show how the causal strength of a variable depends on it being a deviation or difference in a background; (2) They discuss various cues-to-causality such as covariation, temporal order, contiguity in time and space, and similarity of cause and effect; and (3) The discounting of an explanation by specific alternatives is discussed as a special case of the sequential updating of beliefs. GRA

N85-17615# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
ON THE PROBABILITY GENERATING FUNCTIONAL FOR POINT PROCESSES
D. J. Daley (Australian National Univ.) and D. Vere-Jones (Victroia Univ., Wellington, New Zealand) Sep. 1984 19 p
(Contract F49620-82-C-0009)
(AD-A147692; TR-76; AFOSR-84-0987TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

An extended probability generating functional (p.g. fl) bar G[H] = E (exp integral CHI log H(X)N(DX)) is well defined for any point process N on the complete separable metric space CHI over the space bar upsilon sub 0 of measurable functions H: CHI--(0,1) such that INF sub x is an element of CHI to the H(X) power > 0. The distribution of N is determined uniquely by the p.g. fl. G[H] is identical with bar G[H] over the smaller space upsilon sub 0 of functions H belonging to the set bar upsilon sub 0 for which I-H has bounded support. Continuity results for bar G[.] involving pointwise convergent sequences the set whose members are H sub N is contained in upsilon sub O or bar upsilon sub O or bar upsilon is identical with the et whose members are measurable H: CHI--[0,1] or upsilon = the set whose members are H is an element of set bar upsilon: I-H has bounded support are reviewed, and used in furnishing a complete p.g. fl. proof of the mixing property of certain stationary cluster processes. R.S.F.

N85-17616# North Carolina Univ., Chapel Hill. Inst. of Statistics.
A NUMERICAL ANALYSIS OF SAMPLING PLANS BASED ON PRIOR DISTRIBUTION AND COSTS
H. Schneider Jun. 1984 36 p
(Contract F49620-82-C-0009)
(AD-A147718; MIMEO SER-1558; AFOSR-84-0979TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper deals with some pitfalls linked with the sampling model based on prior distribution and costs. First, a model is designed which encompasses most of the existing Bayesian cost models. The efficiency of sampling plans is investigated in a numerical study. It is shown that under realistic assumptions, described by Dodge (1969) and Schilling (1982), sampling plans based on prior distributions and costs are only efficient in an outlier model, i.e., if almost all lots are good quality and only a low number of lots, denoted as outlier lots, have very poor quality. Furthermore, it is demonstrated that for the Polya distribution a gain of sampling is linked with a high percentage of rejections, i.e., when the prior distribution cost relationship is such that less than 5% of the lots should be rejected sampling becomes inefficient. GRA

N85-17617# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mathematical Sciences.
A MOVING FINITE ELEMENT METHOD FOR TIME DEPENDENT PARTIAL DIFFERENTIAL EQUATIONS WITH ERROR ESTIMATION AND REFINEMENT

S. Adjerid and J. E. Flaherty Sep. 1984 30 p
(Contract DAAG29-82-K-0197; Grant AF-AFOSR-0192-80)
(AD-A147719; AFOSR-84-0946TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The authors discuss a moving finite element method for solving vector systems of time dependent partial differential equations in one space dimension. The mesh is moved so as to equidistribute the spatial component of the discretization error in H1. They present a method of estimating this error by using p-hierarchic finite elements. The error estimate is also used in an adaptive mesh refinement procedure to give an algorithm that combines mesh movement and refinement. The authors discretize the partial differential equations in space using a Galerkin procedure with piecewise linear elements to approximate the solution and quadratic elements to estimate the error. A system of ordinary differential equations for mesh velocities are used to control element motions. The authors use existing software for stiff ordinary differential equations for the temporal integration of the solution, the error estimate, and the mesh motion. Computational results using a code based on this method are presented for several examples. GRA

N85-17618# Massachusetts Inst. of Tech., Cambridge.
ASYMPTOTIC METHODS FOR THE ANALYSIS, ESTIMATION, AND CONTROL OF STOCHASTIC DYNAMIC SYSTEMS Interim Report, 1 Jul. 1983 - 30 Jun. 1984
A. S. Willsky Aug. 1984 31 p
(Grant AF-AFOSR-0258-82)
(AD-A147758; LIDS-SR-1401; AFOSR-84-0992TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The basic scope of this grant is to carry out fundamental research in the analysis, control, and estimation of complex systems with particular emphasis on the use of methods of asymptotic analysis and multiple time scales to decompose complex problems into interconnections of simpler ones. During the time period covered by this report significant progress has been made in several areas, leading to important results and to promising directions for further research. GRA

N85-17619# Naval Research Lab., Washington, D. C.
MULTIPLE CHANNEL ADAPTIVE FILTERING USING A FAST ORTHOGONALIZATION NETWORK: AN APPLICATION TO EFFICIENT PULSED DOPPLER RADAR PROCESSING Interim Report
K. Gerlach 28 Sep. 1984 21 p
(AD-A147929; NRL-8840) Avail: NTIS HC A02/MF A01 CSCL 12/1

A numerically efficient algorithm is developed for adaptively filtering multiple input channels into desired multiple output channels. The algorithm is a type of adaptive lattice filter which employs a Fast Orthogonalization Network (FON) algorithm for numerical efficiency. Past researchers have concentrated on developing efficient lattice algorithms for the processing of stationary input channels; i.e., the input covariance matrix is Toeplitz in form. The algorithm developed in this report is designed to adaptively filter nonstationary input channels. Various implementations of the FON algorithm are given, and a performance measure based on the number of operations is formulated. An application of the technique to adaptive Doppler processing is presented.
Author (GRA)

N85-17620# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mathematical Sciences.
A LOCAL REFINEMENT FINITE ELEMENT METHOD FOR TIME DEPENDENT PARTIAL DIFFERENTIAL EQUATIONS
J. E. Flaherty and P. K. Moore Aug. 1984 12 p
(Contract DAAG29-82-K-0197; Grant AF-AFOSR-0192-80)
(AD-A147943; AFOSR-84-0943TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The authors discuss an adaptive local refinement finite element method for solving initial-boundary value problems for vector systems of partial differential equations in one space dimension and time. The method uses piecewise bilinear rectangular space-time finite elements. For each time step, grids are automatically added to regions where the local discretization error is estimated as being larger than a prescribed tolerance. The authors discuss several aspects of their algorithm, including the tree structure that is used to represent the finite element solution and grids, an error estimation technique, and initial boundary conditions at coarse-fine mesh interfaces. The authors also present computational results for a simple linear hyperbolic problem, a problem involving Burger's equation, and a model combustion problem. GRA

N85-17621# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Sciences Research Group.
THE TRAVELING SALESMAN PROBLEM ON A GRAPH AND SOME RELATED INTEGER POLYHEDRA
G. Cornuejols, J. Fonlupt, and D. Naddef Jul. 1984 47 p
(Contract N00014-82-K-0329; Grant NSF ECS-82-05425)
(AD-A147953; MSRR-510) Avail: NTIS HC A03/MF A01 CSCL 12/1

Given a graph G = (N,E) and a certain length functions the Graphical Traveling Salesman Problem is that of finding a minimum length cycle going at least once through each node of G. This formulation has advantages over the traditional formulation where each node must be visited exactly once. The authors give some facet inducing inequalities of the convex hull of the solutions to that problem. Some related integer polyhedra are also investigated. Finally, an efficient algorithm is given when G is a series-parallel graph. GRA

N85-17622# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision.
DISTRIBUTED ASYNCHRONOUS RELAXATION METHODS FOR CONVEX NETWORK FLOW PROBLEMS
Dimitri P. Bertsekas and Didier ElBaz Oct. 1984 27 p
(Contract N00014-84-K-0357; Grant NSF ECS-82-17668; DARPA Order 3045)
(AD-A148027; LIDS-P-1417) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document considers the solution of the single commodity strictly convey network flow problem in a distributed asynchronous computation environment. The dual of this problem is unconstrained, differentiable, and well suited for solution via Gauss-Seidel relaxation. It is shown that the structure of the dual allows the successful application of a distributed asynchronous method whereby relaxation iterations are carried out in parallel by several processors in arbitrary order and with arbitrarily large interprocessor communication delays. Author (GRA)

N85-17623# Naval Postgraduate School, Monterey, Calif. Dept. of Mathematics.
A THEOREM ON THE OPTIMAL ALLOCATION OF EFFORT Technical Progress Report, Jan. - Sep. 1984
Guillermo Owen and Bernard Grofman Oct. 1984 19 p
(Contract N00014-84-WR-41001)
(AD-A148028; NPS-53-85-0003) Avail: NTIS HC A02/MF A01 CSCL 12/1

A limited time budget is to be allocated to learning several tasks, so as to maximize the probability that a majority of these tasks will be performed correctly. It is shown that in the symmetric linear case, it is optimal to allocate time equally among k to the tasks, where k is at least a majority, but may be more, depending on the actual time available. In particular, time is allocated to all tasks if there is not much time available, but to only a majority of the tasks if the available amount of time is reasonably great.
Author (GRA)

N85-17624# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
SIGNAL RECONSTRUCTION FROM FOURIER TRANSFORM SIGN INFORMATION
Susan R. Curtis, Jae S. Lim, and Alan V. Oppenheim May 1984 41 p
(Contract N00014-81-K-0742; Grant NSF ECS-80-07102)
(AD-A148039; AD-E850735; TR-500) Avail: NTIS

HC A03/MF A01 CSCL 12/1

This paper presents new results on the reconstruction of signals from only the sign of the real part of the Fourier transform. Specifically, the authors developed new theoretical results which state conditions under which two-dimensional signals are uniquely specified to within a scale factor with this information and show that these conditions include a broad class of signals. Furthermore, this result was applied to the problem of reconstructing two-dimensional signals from their zero crossings. Also presented are two algorithms for reconstructing a signal from sign information in either the time or frequency domain. Author (GRA)

N85-17625# Honeywell Systems and Research Center, Minneapolis, Minn.

RECOGNITION OF COMPLEX 3-DIMENSIONAL OBJECTS USING 3-DIMENSIONAL MOMENT INVARIANTS

F. A. Sadjadi Sep. 1984 5 p

(Contract F49620-83-C-0134)

(AD-A148119; AFOSR-84-0944TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A technique for the recognition of complex three dimensional objects is presented. The complex 3-D objects are presented in terms of their 3-D invariants and algebraic expressions that remain invariant independent of the 3-D objects' orientation and locations in the field of view. The method for representing more complex objects is extended. Two complex objects are represented digitally. The 3-D moment invariants were calculated, and the invariancy of these 3-D invariant moment expressions is verified by changing the orientation and the location of the objects in the field. B.G.

N85-17626# North Carolina Univ., Chapel Hill. Dept. of Statistics.

THE EM ALGORITHM FOR CENSORED DATA

H. Schneider and L. Weissfeld 1984 19 p

(Contract F49620-82-C-0009)

(AD-A148136; MIMEO SER-1557; AFOSR-84-0939TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Three methods for applying the expectation maximization algorithm to censored data are considered, the Buckley-James, a proposed simpler nonparametric method and a normal model for censored data. A new estimator for the variance of y in the Buckley-James model is proposed and simulations comparing the three methods are described. To illustrate the use of these methods they are applied to the Stanford heart transplant data.

Author (GRA)

N85-17627# Connecticut Univ., Storrs. Dept. of Electrical Engineering and Computer.

ROBUST LINEAR FILTERING FOR MULTIVARIABLE STATIONARY TIME SERIES, PART 3

H. Tsaknakis and P. Papantoni-Kazakos Oct. 1984 34 p

(Grant AF-AFOSR-0229-83)

(AD-A148169; UCT/DEECS/TR-84-12; AFOSR-84-1060TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The problem of asymptotic non-causal linear filtering for statistically contaminated multivariable second order stationary time series is considered. It is assumed that the spectra of both the signal and the noise components of the observation process are uncertain. This uncertainty is modeled by requiring that the spectra belong to two well defined spectral classes. Subsequently, a game theoretic formalization is adopted, and for some specific spectral classes saddle point solutions are found and analyzed.

Author (GRA)

N85-17628# Washington Univ., Seattle. Dept. of Chemistry.

BACKGROUND DETECTION AND CORRECTION IN MULTICOMPONENT ANALYSIS Interim Technical Report

D. W. Osten and B. R. Kowalski 1 Nov. 1984 47 p

(Contract N00014-75-C-0536; NR Proj. 051-565)

(AD-A148251; TR-30) Avail: NTIS HC A03/MF A01 CSCL 12/1

The multicomponent linear additive model is frequently used in analytical chemistry for the analysis of several components in a single sample. The pressure of unsuspected components in the mixture, which affect the measured response, results in a volume dependent sample background. A method has been developed to test for the presence of a background interferent during the quantitation step of a multicomponent analysis. If a background is detected, quantitative estimates of the desired analytic concentrations can be obtained by applying several chemically and physically meaningful constraints. Two distinct quantitation methods, which are known as the perpendicular projection and the extreme vertex projection techniques, have been proposed. Author (GRA)

N85-17629# Washington Univ., Seattle. Dept. of Chemistry.

MULTICOMPONENT CALIBRATION AND QUANTITATION METHODS Interim Technical Report

D. W. Osten and B. R. Kowalski 1 Nov. 1984 48 p

(Contract N00014-75-C-0536; NR Proj. 051-565)

(AD-A148252; TR-32) Avail: NTIS HC A03/MF A01 CSCL 12/1

A systematic examination of calibration and quantitation methods available to analytical chemistry is made. First, simple linear calibration with one sensor is reviewed with an emphasis on chemical problems that can invalidate calibration models and what can be done about them. Then, shift is made to multivariate methods used for multicomponent analysis ending in a discussion of bilinear forms. Author (GRA)

N85-17630# Naval Postgraduate School, Monterey, Calif.

UTILIZATION OF NUMERICAL OPTIMIZATION TECHNIQUES IN THE DESIGN OF ROBUST MULTI-INPUT, MULTI-OUTPUT CONTROL SYSTEMS Ph.D. Thesis

V. C. Gordon Sep. 1984 178 p

(AD-A148289) Avail: NTIS HC A09/MF A01 CSCL 12/1

A direct design method for solving the problem of robustness to cross-coupling perturbations in multivariable control systems is presented in this thesis. The method uses numerical optimization procedures to manipulate the system feedback gains as direct design variables. The manipulation is accomplished in a manner that produces desired performance by pole placement and robustness by modification of the minimum singular values of the system return difference matrix. Channels affected by cross-coupling perturbation may be recognized by the character of their transfer function plot. The mechanism used by the pole placement and robustness routine in obtaining a robust design is evident from the gain changes associated with the transfer function diagram and the zero shifts shown on pole-zero plots. The pole placement and robustness routine uses gain equalization and zero assignment to modify the characteristics of the system in the areas of low singular values, producing a robust design. GRA

N85-17631# Maryland Univ., College Park. Lab. for Numerical Analysis.

A FEEDBACK FINITE ELEMENT METHOD WITH A POSTERIORI ERROR ESTIMATION. PART 1. THE FINITE ELEMENT METHOD AND SOME BASIC PROPERTIES OF THE A POSTERIORI ERROR ESTIMATOR Final Report

I. Babuska and A. Miller (Australian National Univ.) 8 Oct. 1984 71 p

(Contract N00014-77-C-0623)

(AD-A148345; BN-1031) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper is the first in a series of three which discusses some theoretical and practical aspects of a feedback finite element method for solving systems of linear second order elliptic partial differential equations (with particular interest in classical linear elasticity). This first part introduces some nonstandard finite element spaces, though based on the usual square bilinear elements, permit local mesh refinement. The algebraic structure of these spaces and their approximation properties are analyzed. An equivalent estimator for the H1 finite element error is developed. GRA

N85-17632# North Carolina Univ., Charlotte. Dept. of Mathematics.

A POWER TRANSFORMATION EXPONENTIAL REGRESSION MODEL FOR CENSORED FAILURE TIME DATA
David Young (Brunel Univ., England) and Mohamed Abdel-Hameed Nov. 1984 14 p
(Grant AF-AFOSR-0245-80; AF Proj. 2304)
(AD-A148377; AFOSR-84-1093TR; TR-22) Avail: NTIS HC A02/MF A01 CSCL 12/1

A power transformation regression model is considered for exponentially distributed time to failure data with right censoring, procedures for estimation of parameters by maximum likelihood and assessment of goodness of model fit are described and illustrated. Author (GRA)

N85-17633# Duke Univ., Durham, N. C. Dept. of Computer Science.
EXTENDED STOCHASTIC PETRI NETS: APPLICATIONS AND ANALYSIS
J. B. Dugan, K. S. Trivedi, R. M. Geist (Clemson Univ.), and V. F. Nicola Nov. 1984 25 p
(Grant AF-AFOSR-0132-84)
(AD-A148439; AFOSR-84-1095TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

An Extended Stochastic Petri Net (ESPN) model, useful for modeling systems which exhibit concurrent, asynchronous, or nondeterministic behavior is developed. Applications demonstrating the flexibility of the model for a variety of system modeling applications are presented. Analytic techniques for the representation of a class of ESPNs as Markov or semi-Markov processes are discussed, as is the simulation of more general models. Finally, DEEP (the Duke ESPN Evaluation Package) is previewed. Author (GRA)

N85-17634# Tennessee Univ., Knoxville. Dept. of Electrical Engineering.
COMPLEXITY, TESTABILITY, AND FAULT ANALYSIS OF DIGITAL, ANALOG AND HYBRID SYSTEMS Final Report, 1 Feb. 1982 - 30 Jun. 1984
R. C. Gonzalez, M. G. Thomason, and B. M. E. Moret 30 Sep. 1984 161 p
(Contract N00014-78-C-0311)
(AD-A148465; TR-EE-84-50) Avail: NTIS HC A08/MF A01 CSCL 12/1

The research described in this report is divided into two major areas: (1) discrete mathematical descriptions of digital, analog, and hybrid systems, and (2) techniques for measuring parameters for characterizing certain aspects of such systems. New results are presented in decision trees, fault trees, testing complexity, optimal solution of linear inequalities, and the computation of moments and semi-invariants of the interclass Mahalanobis distance. Author (GRA)

N85-17635# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN ANALYSIS OF ROBUST AND EFFICIENT PRIORS ASSOCIATED WITH A FINITE BAYESIAN MODEL FOR COMPLIANCE TESTING M.S. Thesis
S. Marino and K. OShaughnessy Sep. 1984 86 p
(AD-A148497; AFIT/GSM/LSY/84S-21) Avail: NTIS HC A05/MF A01 CSCL 12/1

This research examines the reliability and validity of the Finite Bayesian Procedure (FBP) model through an evaluation of robust and efficient prior probability distributions. The model, developed by James Godfrey and Richard Andrews, presents a different approach to compliance testing in auditing. This study utilizes small and moderate-sized populations, four population error rates, a fixed sample size, and four reliability levels. In addition, four expected error rates, based on a beta prior probability distribution and ranging from very low to high, combined with three variance levels and a uniform distribution, are used to evaluate the model. The results indicate that the model is adequately reliable and valid. However, the uniform distribution seems to perform best of all prior probability distributions tested. Moreover, tradeoffs between robustness, efficiency, and reliability seem a necessity when using the Finite Bayesian Procedure model. Author (GRA)

N85-17636# Yale Univ., New Haven, Conn. Dept. of Computer Science.
USE OF ITERATIVE LINEAR AND NONLINEAR ALGEBRAIC METHODS FOR SOLVING LARGE STIFF SYSTEMS OF ODES Final Report, 1 Mar. 1983 - 29 Feb. 1984
T. F. Chan 23 Sep. 1984 7 p
(Grant AF-AFOSR-0097-83)
(AD-A148516; AFOSR-84-0942TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This is the final scientific report which summarizes the main results accomplished in this research. GRA

N85-17637# Duke Univ., Durham, N. C. Dept. of Computer Science.
A SINGLE SERVER QUEUE WITH MIXED TYPES OF INTERRUPTIONS
V. F. Nicola Nov. 1984 33 p
(Contract DAAG29-84-K-0045; Grants AF-AFOSR-0132-84; NSF MCS-83-0200)
(AD-A148538; AFOSR-84-1097TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document considered an M/G/1 queue with mixed types of Poisson interruptions. A derivation of the Laplace Steilties Transform of the completion time associated with a customer's service is presented. The author introduces the definition of the effective service time and gives probabilistic arguments to the derivation of the first and second moments of the completion time. The average number of customers in the system is obtained and the relation to the Pollaczek-Khintchine formula is noted. The results are applied to the modeling of checkpointing and recovery in a transactional system. GRA

N85-17638# Science Applications, Inc., McLean, Va.
SAI (SCIENCE APPLICATIONS, INC.) INTERIM SCATTERING MODEL/ICE (SISM/ICE)
R. R. Greene Apr. 1984 17 p
(Contract N00014-84-C-0180)
(AD-A148596; SAI-84/1100) Avail: NTIS HC A02/MF A01 CSCL 12/1

A reflection loss model for acoustic propagation under Arctic sea ice is described. It is applicable over the frequency range of 0 to 45 degrees. A sequence of scattering loss formulas based on perturbation techniques provides a smooth transition in frequency to an asymptotic loss level, based on a boss model, at the highest frequencies. GRA

N85-17639# State Univ. of New York, Stony Brook. Dept. of Applied Mathematics and Statistics.
MODULES OF CONTINUUM STRUCTURES, REVISED
L. A. Baxter and C. Kim Jun. 1984 23 p
(Grants NSF ECS-83-06871; AF-AFOSR-0243-84)
(AD-A148620; AFOSR-84-1083TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document presents continuum structure functions which are nondecreasing mapping from the unit hypercube to the unit interval. The main results of Birnbaum and Esary's theory of modules of binary structure functions, in particular the Three Modules Theorem, are described. GRA

N85-17640# State Univ. of New York, Stony Brook. Dept. of Applied Mathematics and Statistics.
BOUNDING THE STOCHASTIC PERFORMANCE OF CONTINUUM STRUCTURE FUNCTIONS 1 Technical Report
L. A. Baxter and C. Kim Oct. 1984 18 p
(Grants NSF ECS-83-06871; AF-AFOSR-0243-84)
(AD-A148621; AFOSR-84-1084TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A continuum structure function gamma is a nondecreasing mapping from the unit hypercube to the unit interval. Minimal path (cut) sets of upper (lower) simple continuum structure functions

are introduced and are used to determine bounds on the distribution of gamma (X) when X is a vector of associated random variables and when is right (left)-continuous. It is shown that, if gamma admits of a modular decomposition, improved bounds may be obtained. Author (GRA)

N85-17641# Kansas Univ. Center for Research, Inc., Lawrence.
A MODIFIED MONTE-CARLO TECHNIQUE FOR THE SIMULATION OF SATELLITE COMMUNICATION SYSTEMS Final Report, 1 Jul. 1983 - 31 Jul. 1984
K. S. Shanmugan 30 Oct. 1984 119 p
(Grant AF-AFOSR-0171-83)
(AD-A148689; TR-617-1; AFOSR-84-1049TR) Avail: NTIS HC A06/MF A01 CSCL 12/1

Civilian and military communication networks use satellite links for digital transmission of information. The analysis of performance of digital communication systems operation over non-linear satellite channels is a difficult task and no complete analytical treatment of the problem is currently available. Several recent efforts have been directed towards the evaluation of performance as measured by the end-to-end symbol error probability using Monte-Carlo simulations. These simulations require excessively large sample sizes and are not practical for estimating low values of error probabilities. In this report, the investigators present a technique for reducing the sample size requirements of Monte-Carlo simulation of satellite communication links. The method is based on a combination of a modified (importance) sampling technique and an extrapolation technique Sample size reduction of the order of 100 appears to be possible with this technique. GRA

N85-17642# Clarkson Coll. of Technology, Potsdam, N.Y. Inst. for Nonlinear Studies.
MULTIDIMENSIONAL INVERSE SCATTERING FOR FIRST ORDER SYSTEMS
A. I. Nachman (Rochester Univ.) and M. J. Ablowitz Jul. 1984 16 p
(Grant AF-AFOSR-3674-78)
(AD-A148711; AFOSR-84-0918TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A method for solving the inverse problem for a class of multidimensional first order systems is given. The analysis yields equations which the scattering data must satisfy; these equations are natural candidates for characterizing admissible scattering data. The results are used to solve the multidimensional N-wave resonant interaction equations. Author (GRA)

N85-17643# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
A CASE OF A NOT-SO-STRANGE STRANGE ATTRACTOR
H. A. Lauwerier Apr. 1984 18 p refs Submitted for publication
(CWI-AM-R8406; B8471635) Avail: NTIS HC A02/MF A01

An iterative horseshoe map in which almost everything can be expressed in explicit analytic expressions involving only elementary trigonometry is presented. An illustration of an unstable manifold which is also a strange attractor with a Cantor-like transsection having a simple fractal dimension is obtained. A particular transsection yields a set of homoclinic and of heteroclinic points. Author (ESA)

N85-17644# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
GENERALIZED PREDICTOR-CORRECTOR METHODS OF HIGH ORDER FOR THE TIME INTEGRATION OF PARABOLIC DIFFERENTIAL EQUATIONS
P. J. vanderHouwen, B. P. Sommeijer, and H. B. deVries Jan. 1984 38 p refs Submitted for publication
(CWI-NM-R8402; B8471281) Avail: NTIS HC A03/MF A01

A general class of predictor-corrector methods is presented and explicit expressions for the local truncation error and the stability polynomial are derived. Examples of methods of orders up to six which are suitable for the integration of semidiscrete parabolic differential equations are given. Numerical experiments show that the higher order methods are more efficient than the lower order methods. The generalized predictor-corrector methods are compared with the ADI method, confirming that for smooth parabolic problems high order time integrators are superior to lower order integrators. Author (ESA)

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N85-17645# Stanford Univ., Calif. Dept. of Statistics.
METHODS AND APPLICATIONS OF TIME SERIES ANALYSIS. PART 2: LINEAR STOCHASTIC MODELS
T. W. Anderson and N. D. Singpurwalla Oct. 1984 124 p Prepared in cooperation with George Washington Univ., Washington, DC
(Contract DAAG29-82-K-0156)
(AD-A147292; TR-12; ARO-19065.12-MA) Avail: NTIS HC A06/MF A01 CSCL 12/1

This is the second in a series of technical reports developing the most modern procedures of time series analysis and forecasting for use in engineering, the physical sciences, and the social sciences. The exposition of methodology is based on a succinct presentation of the theoretical background and is illustrated with appropriate examples from engineering, maintenance and reliability economics, and other physical and social sciences. This report is concerned with linear statistical models, especially autoregressive processes. Author (GRA)

N85-17646# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
EMPIRICAL BAYES RULES FOR SELECTING GOOD BINOMIAL POPULATIONS
S. S. Gupta and T. C. Liang Oct. 1984 32 p
(Contract N00014-84-C-0167)
(AD-A147614; TR-84-37) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper deals with the problem of selecting good binomial populations compared with a standard or a control through the empirical Bayes approach. Two cases have been studied: one is that the prior distribution is completely unknown and the other is that the prior distribution is symmetrical about $p = 1/2$, but its form is still unknown. In each case, empirical Bayes rules are derived and the rate of convergence of corresponding empirical Bayes rules is also studied. GRA

N85-17647# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
RECENT RESULTS ON CHARACTERIZATION OF PROBABILITY DISTRIBUTIONS: A UNIFIED APPROACH THROUGH EXTENSIONS OF DENY'S THEOREM
C. R. Rao and D. N. Shanbhag Sep. 1984 36 p
(Contract F49620-82-K-0001)
(AD-A147631; TR-84-39; AFOSR-84-1056TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The problem of identifying solutions of general convolution equations relative to a group has been studied in two classical papers by Choquet and Deny. Recently, Lau and Rao have considered the analogous problem relative to a certain semigroup of the real line, which extends the results of Marsaglia and Tubilla and a lemma of Shanbhag. The extended versions of Deny's theorem contained in the papers by Lau and Rao, and Shanbhag (which referred to as LRS theorems) yield as special cases improved versions of several characterizations of exponential, Weibull, stable, Pareto, geometric, Poisson and negative binomial distributions obtained by various authors during the last few years. This paper reviews some of the recent contributions to characterization of probability distributions (whose authors do not seem to be aware of LRS theorems or special cases existing earlier) and show how improved versions of these results follow as immediate corollaries to LRS theorems. It also gives a short proof of Lau-Rao theorem based on Deny's theorem and thus establish a direct link between the results of Deny and those of Lau and Rao. A

variant of Lau-Rao theorem is proved and applied to some characterization problems. Author (GRA)

N85-17648# Missouri Univ., Columbia. Dept. of Statistics.
IMPROVED ESTIMATION PROCEDURES FOR ITEM RESPONSE FUNCTIONS
R. K. Tsutakawa Oct. 1984 22 p
(Contract N00014-81-K-0265)
(AD-A147677; RR-84-2) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report summarized the main findings of a research which focused on the estimation of parametric item response curves under the assumption that univariate ability parameters are sampled from some parametric population distribution. Both maximum likelihood and Bayesian approaches have been studied and compared to the more conventional approaches where abilities are treated as fixed parameters. Author (GRA)

N85-17649# North Carolina Univ., Chapel Hill. Inst. of Statistics.
THE PERFORMANCE OF VARIABLE SAMPLING PLANS WHEN THE NORMAL DISTRIBUTION IS TRUNCATED
H. Schneider Jun. 1984 22 p
(Contract F49620-82-C-0009)
(AD-A147717; MIMEO SER-1559; AFOSR-84-0980TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The robustness of standard variable sampling plans by Lieberman and Resnikoff is considered with respect to a truncation of the normal distribution. It is shown how variable sampling plans can be designed if the truncation point and delta are known. For the unknown delta case it is shown that the operating characteristic curve is dependent upon the unknown delta. Author (GRA)

N85-17650# California Univ., San Diego, La Jolla. Dept. of Electrical Engineering and Computer Sciences.
CALCULATION OF CUMULATIVE DISTRIBUTIONS AND DETECTION PROBABILITIES IN COMMUNICATIONS AND OPTICS Interim Report, 30 Sep. 1983 - 29 Sep. 1984
C. W. Helstrom 1 Oct. 1984 39 p
(Grant AF-AFOSR-0343-82)
(AD-A147781; AFOSR-84-0950TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Methods were investigated for evaluating cumulative distributions of random variables by numerical quadrature of contour integrals in the complex plane involving their momentor probability-generating functions. These methods have been applied to the sum of M outputs of a linear rectifier whose input is Gaussian noise plus a narrowband signal, to the average power of Gaussian random process, to the number of photoelectrons counted from a photoelectric detector onto which both a coherent light signal and incoherent background are incident, to the output of an avalanche photodiode, and to the statistics figuring in Wilcoxon rank tests. Radar detectors estimating the ambient noise level from censored samples have also been analyzed. Author (GRA)

N85-17651# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
ON THE ERGODICITY OF BILINEAR TIME SERIES MODELS AND SOME APPLICATIONS
S. I. Akamanam, M. B. Rao, and K. Subramanyam Sep. 1984 19 p
(Contract F49620-82-K-0001; AF Proj. 2304)
(AD-A148032; AFOSR-84-1003TR; Rept-84-40) Avail: NTIS HC A02/MF A01 CSCL 12/1

Existence, strict stationary and ergodicity of Bilinear Time Series Models for a given input White Noise process and parameter values is studied in detail in this paper. Using ergodicity of the model, estimation of the parameters by the method of moments is suggested and some comparisons are made with the method of least squares. Author (GRA)

N85-17652# Stanford Univ., Calif. Dept. of Statistics.
CONVERGENCE OF QUASI-STATIONARY TO STATIONARY DISTRIBUTIONS FOR STOCHASTICALLY MONOTONE MARKOV PROCESSES
Moshe Pollak (Hebrew Univ. of Jerusalem) and David Siegmund Oct. 1984 10 p
(Contract N00014-77-C-0306; NR Proj. 042-373)
(AD-A148041; AD-E850735; TR-31) Avail: NTIS HC A02/MF A01 CSCL 12/1

It is shown that if a stochastically monotone Markov process of (0, infinity) with stationary distribution H has its state space truncated by making all states in (B, infinity) absorbing, then the quasi-stationary distribution of the new process coverages to H as B approaches limit of infinity. Author (GRA)

N85-17653# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Computer Engineering
PROBABILISTIC ANALYSIS OF ALGORITHMS FOR NP-COMPLETE PROBLEMS Final Scientific Report, 1 Sep. 1983 - 31 Aug. 1984
John V. Franco Oct. 1984 12 p
(Grant AF-AFOSR-0331-82; AF Proj. 2304)
(AD-A148207; AFOSR-84-1005TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The goal of this research is to develop and analyze algorithms which can, in some practical sense, solve certain NP-complete problems efficiently. By solve we mean determine whether a solution to a given instance of an NP-complete problem exists where, for the problems we have considered, a solution is an assignment of values to a list of variables which cause some predicate to be true. We do not consider actually finding solutions when they exist since doing so adds unnecessary complexity to the statement of the algorithms: the algorithms we consider can all be modified to find solutions without significantly altering performance. NP-complete problems are found in Crytology, Operations Research, Artificial Intelligence, Computer System Design and many other areas. There is no known algorithm for any NP-complete problem which runs in time bounded by a polynomial on the length of the input (polynomial time) in the worst case nor is one likely to be found. We seek algorithms which solve nearly every instance of specific NP-complete problems in polynomial time. GRA

N85-17654# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
A NOTE ON THE PREDICTION ERROR FOR SMALL TIME LAGS INTO THE FUTURE
J. A. Bucklew (Wisconsin Univ., Madison) Sep. 1984 16 p
(Contract F49620-82-C-0009; AF Proj. 2304)
(AD-A148221; TR-78; AFOSR-84-1055TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Explicit expressions are derived for derivatives at zero lay of the mean square prediction error of a class of random processes which includes the rational case. A sufficient condition is given to determine whether a random process is in the class. Author

N85-17655# Stanford Univ., Calif. Lab. for Computational Statistics.
A VARIABLE SPAN SMOOTHER
Jerome H. Friedman Nov. 1984 33 p
(Contracts N00014-83-K-0472; N00014-81-K-0340; DE-AC03-76SF-00515; DE-AT03-81ER-10843; DAAG39-82-K-0056)
(AD-A148241; LCS-TR-5; SU-SLAB-PUB-3477) Avail: NTIS HC A03/MF A01 CSCL 12/1

A variable span smoother based on linear fits is described. Local cross-validation is used to estimate the optimal span as a function of abscissa value. Computationally efficient algorithms making use of updating formulas are presented. Author (GRA)

N85-17656# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
MINIMAX MULTIPLE t-TESTS FOR COMPARING k NORMAL POPULATIONS WITH A CONTROL
S. S. Gupta and K. J. Miescke Nov. 1984 20 p Prepared in cooperation with Illinois Univ. at Chicago

(Contract N00014-84-C-0167)
(AD-A148306; TR-84-44) Avail: NTIS HC A02/MF A01 CSCL 12/1

Let Pi sub 1,..., Pi sub k be k normal populations with unknown means Theta sub 1,..., Theta sub k, and a common unknown variance Sigma squared 2 >or= 0. Based on independent samples of sizes n sub 1,..., n sub k, the populations are to be partitioned into two sets, where the first one contains all Pi sub i with Theta sub i >or= theta sub 0, and where the other one contains the rest. At first it is assumed that Theta sub 0 is known. Under an additive a sub i -b sub i loss function a minimax procedure is derived which is of a simple natural form. The proof of minimaxity makes use of the Bayes approach and involves a sequence of nonsymmetric priors, which play a similar role as a least favorable prior in simpler problems. Analogous results are presented for the case that Theta sub 0 is not known. In this case, a control normal population is assumed to exist from which an additional sample of size n sub 0 can be drawn. Author (GRA)

N85-17657# Stanford Univ., Calif. Dept. of Operations Research.
PREMATURELY TERMINATED SEQUENTIAL TESTS FOR MIL-STD 781C
C. Derman, G. J. Lieberman, and Z. Schechner Aug. 1984 23 p
(Contract N00014-75-C-0561; Grant NSF DMS-84-05413)
(AD-A148417; SU-TR-212) Avail: NTIS HC A02/MF A01 CSCL 12/1

Formulas and tables are provided making it possible for users of the truncated sequential probability ratio tests of MIL-STD 781C to make acceptance or rejection decisions when the test procedure is prematurely truncated. Author (GRA)

N85-17658# Florida State Univ., Tallahassee. Dept. of Statistics.
GENERATING POSITIVELY CORRELATED RANDOM VARIABLES FROM A SEQUENCE OF INDEPENDENT RANDOM VARIABLES WITH SYMMETRIC LOGARITHMICALLY CONCAVE DENSITIES
M. Abdel-Hameed and F. Proschan Aug. 1984 12 p Prepared in cooperation with Univ. of North Carolina
(Contract F49620-82-K-0007; Grant AF-AFOSR-0245-80)
(AD-A148438; FSU-M685; UNCC-21; AFOSR-84-1092TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The area of positive and negative dependence of multivariate distributions has attracted the attention of many authors over the past decade. This paper investigates covariance inequalities for a class of logarithmically concave densities. GRA

N85-17659# Naval Postgraduate School, Monterey, Calif.
ANTISAMPLING FOR ESTIMATION: AN OVERVIEW
N. C. Rowe Oct. 1984 29 p
(AD-A148545; NPS52-84-016) Avail: NTIS HC A03/MF A01 CSCL 12/1

We survey a new way to get quick estimates of the values of simple statistics (like count, mean, standard deviation, maximum, median, and mode frequency) on a large data set. This approach is a comprehensive attempt (apparently the first) to estimate statistics without any sampling, by reasoning about various sets containing a population interest. Our antisampling techniques have connections to those of sampling (and have duals in many cases), but they have different advantages and disadvantages, making antisampling sometimes preferable to sampling, sometimes not. In particular, they can only be efficient when data is in a computer, and they exploit computer science ideas such as production systems and database theory. Antisampling also requires the overhead of construction of an auxiliary structure, a database abstract. Tests on sample data show similar or better performance than simple random sampling. We also discuss more complex methods of sampling and their disadvantages. GRA

N85-17660# North Carolina Univ., Chapel Hill. Dept. of Statistics.
RESEARCH IN STOCHASTIC PROCESSES Interim Scientific Report, 1 Nov. 1983 - 31 Aug. 1984
S. Cambanis, R. J. Carroll, G. Kallianpur, and M. R. Leadbetter Oct. 1984 63 p
(Contract F49620-82-C-0009)
(AD-A148622; AFOSR-84-1080TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

Document describes research conducted in the area of stochastic processes and in statistical estimation and inference. GRA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N85-17661# Chicago Univ., Ill. Center for Decision Research.
A THEORY OF PREFERENCE REVERSALS
W. M. Goldstein and H. J. Einhorn Aug. 1984 71 p
(Contract N00014-84-C-0018)
(AD-A147952; TR-11) Avail: NTIS HC A04/MF A01 CSCL 12/1

The preference reversal phenomenon refers to the fact that people who choose gamble A over B often ask for more money to sell B than A. This finding is remarkably robust over subjects, experiments, differing incentives, and types of gambles (e.g., gains vs. losses). However, previous research has confounded response method (judgment vs. choice) with the worth scale on which the response is expressed (prices in dollars vs. attractiveness of the gamble). When these two factors are crossed in a 2 x 2 design, 6 pairs of preference reversals are theoretically possible. An experiment to test for the existence of these reversals revealed that 5 out of 6 types were significant. A theory to explain these results was developed in which the basic evaluation of a gamble, assumed to be a function of the utilities and probabilities of the payoffs, is translated onto various worth scales via a subjective interpolation process. This process involves the matching of proportional adjustments on the utility scale to those on the worthscales (prices, ratings, etc.). The model accounts for the direction of all 5 reversals and correctly predicts that some directions are impossible. The model is tested on new data from a study by Tversky and Slovic (1984) and fits their data well. GRA

N85-17662# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
NUMERICAL GENERATION OF ORTHOGONAL AND NON-ORTHOGONAL COORDINATES IN TWO DIMENSIONAL SIMPLY AND DOUBLY CONNECTED REGIONS
Z. U. A. Warsi (Mississippi State Univ.) May 1984 60 p refs Sponsored by Minna-James Heinemann Stiftung
(VKI-TN-151) Avail: NTIS HC A04/MF A01

Techniques of mathematical modeling and numerical solution for grid generation in two dimensional simply and doubly connected regions are outlined. Four computer program listings and examples of the generation of nonorthogonal and orthogonal coordinates are included. Author (ESA)

N85-17663# Sheffield Univ. (England). Dept. of Control Engineering.
APPROXIMATE MODELS IN MULTIVARIABLE PROCESS CONTROL: AN INVERSE NYQUIST ARRAY AND ROBUST TUNING REGULATOR INTERPRETATION
D. H. Owens and A. Chotai Jul. 1984 38 p refs
(Grant SERC-GR/B/23250)
(RR-261) Avail: NTIS HC A03/MF A01

Approximate models and plant step data in multivariable design are applied to produce simple, robust design algorithms for process plant which, in the presence of suitable precompensation, has small interaction effects and/or simple loop dynamics that can be approximated by delay-lag models. In one form, the results have a structure and generate a procedure identical to the inverse Nyquist array design technique with Gershgorin circles replaced

by confidence circles deduced from simple graphical operations on plant step data. Other interpretations lead to estimates of the maximum gain required to retain stability in Davison's robust feedback regulator. An optimization procedure for choice of precompensator using step data with strong connections with the method of pseudo-diagonalization is also outlined. Author (ESA)

N85-17664# Sheffield Univ. (England). Dept. of Control Engineering.
DESIGN OF MISMATCHED SMITH PREDICTORS USING PLANT STEP DATA
A. Chotai and D. H. Owens Aug. 1984 9 p refs Presented at IMC Symp. on Appl. of Multivariable System Tech., Plymouth, Engl., Oct. 1984
(Grant SERC-GR/B/23250)
(RR-263) Avail: NTIS HC A02/MF A01

Systematic design techniques for mismatched Smith control schemes using the open-loop plant and model unit step responses are presented. The approaches are all graphical in nature and are easily implemented in an interactive CAD mode. The step response modeling error can be used in producing both graphical frequency-domain and simulation-based time-domain methods to assess the stability and closed-loop performance for mismatch predictor control schemes. Author (ESA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N85-17665# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Pure Mathematics.
A NOTE ON THE G-SPACE VERSION OF GLICKSBERG'S THEOREM
J. deVries May 1984 6 p refs Submitted for publication
(CWI-PM-R8405; B8471267) Avail: NTIS HC A02/MF A01

A generalization of Glicksberg's theorem about the Stone-Cech compactification of products to the context of G-spaces and their maximal G-compactifications was studied, where G is an arbitrary locally compact group, acting on all spaces under consideration. The result is obtained with infinite products. Author (ESA)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N85-17666# Westinghouse Research and Development Center, Pittsburgh, Pa.
HIGH SPECIFIC HEAT DIELECTRICS AND KAPITZA RESISTANCE AT DIELECTRIC BOUNDARIES Annual Report, 1 Aug. 1983 - 1 Aug. 1984
P. W. Eckels, W. N. Lawless, J. H. Parker, Jr., and B. R. Patton 12 Sep. 1984 23 p
(Contract F49620-83-C-0129)
(AD-A148476; Rept-84-9C9-KAPIT-R1; AFOSR-84-1075TR) Avail: NTIS HC A02/MF A01 CSCL 20/3

Kapitza and thermal properties were studied. Two separate Kapitza conductance test facilities were designed and fabricated for both solid-solid and for solid-liquid He II measurements. Preliminary data has been obtained for copper to thalium chloride interface conductance and also for potassium bromide and lithium fluoride thermal conductance to Helium II. For the latter two materials, the test dewars were designed to allow cleaving of the samples under liquid helium and subsequent irradiation of the cleaved surface with UV laser light. Preliminary experiments have been carried out on the effect of UV induced surface defect centers on the Kapitza conductance of potassium bromide. Thermal properties work has included the measurement of the specific heat and thermal conductivity of the cadmium chromium oxide and zinc chromium oxide spinels and of several cesium chloride structure heavy metal halides in the temperature range of 1.5 to 35K. The specific heat data for the spinels was analyzed in terms of both lattice phonons and magnetic contributions. The dependence of the spinel's thermal conductivity of magnetic fields up to 15T was studied and magnetocaloric data has been obtained. For both the zinc and cadmium spinels, the latter results showed a paramagnetic behavior with demagnetization cooling and magnetization heating. GRA

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N85-17667*# Cleveland State Univ., Ohio.
INVESTIGATION ON EXPERIMENTAL TECHNIQUES TO DETECT, LOCATE AND QUANTIFY GEAR NOISE IN HELICOPTER TRANSMISSIONS Final Report
Patrick M. Flanagan and William J. Atherton Washington NASA Jan. 1985 101 p refs Original contains color illustrations
(Grant NAG3-315)
(NASA-CR-3847; E-2294; NAS 1.26:3847) Avail: NTIS HC A06/MF A01 CSCL 20A

A robotic system to automate the detection, location, and quantification of gear noise using acoustic intensity measurement techniques has been successfully developed. Major system components fabricated under this grant include an instrumentation robot arm, a robot digital control unit and system software. A commercial, desktop computer, spectrum analyzer and two microphone probe complete the equipment required for the Robotic Acoustic Intensity Measurement System (RAIMS). Large-scale acoustic studies of gear noise in helicopter transmissions cannot be performed accurately and reliably using presently available instrumentation and techniques. Operator safety is a major concern in certain gear noise studies due to the operating environment. The man-hours needed to document a noise field in situ is another shortcoming of present techniques. RAIMS was designed to reduce the labor and hazard in collecting data and to improve the accuracy and repeatability of characterizing the acoustic field by automating the measurement process. Using RAIMS a system operator can remotely control the instrumentation robot to scan surface areas and volumes generating acoustic intensity information using the two microphone technique. Acoustic intensity studies requiring hours of scan time can be performed automatically without operator assistance. During a scan sequence, the acoustic intensity probe is positioned by the robot and acoustic intensity data is collected, processed, and stored. B.W.

N85-17668*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
AN IMPROVED SOURCE MODEL FOR AIRCRAFT INTERIOR NOISE STUDIES
J. R. Mahan and C. R. Fuller Jan. 1985 30 p refs
(Grant NAG1-493)
(NASA-CR-172517; NAS 1.26:172517) Avail: NTIS HC A03/MF A01 CSCL 20A

There is concern that advanced turboprop engines currently being developed may produce excessive aircraft cabin noise levels. This concern has stimulated renewed interest in developing aircraft interior noise reduction methods that do not significantly increase take off weight. An existing analytical model for noise transmission into aircraft cabins was utilized to investigate the behavior of an improved propeller source model for use in aircraft interior noise studies. The new source model, a virtually rotating dipole, is shown to adequately match measured fuselage sound pressure distributions, including the correct phase relationships, for published data. The virtually rotating dipole is used to study the sensitivity of synchrophasing effectiveness to the fuselage sound pressure trace velocity distribution. Results of calculations are presented which reveal the importance of correctly modeling

the surface pressure phase relations in synchrophasing and other aircraft interior noise studies. R.S.F.

N85-17669# Federal Aviation Administration, Washington, D.C.
TEST OF DISPERSAL OF TURBOJET AIRCRAFT DEPARTURE TRACKS AT WASHINGTON NATIONAL AIRPORT (1983-84), VOLUME 1 REPORT Summary Report, 24 Oct. 1983 - 7 Jan. 1984
Oct. 1984 106 p 2 Vol.
(AD-A148111) Avail: NTIS HC A06/MF A01 CSCL 20/1

This report is Volume 1 of a two-volume set describing the analysis of aircraft noise before, during and after the test of the so-called Scatter Plan, a dispersal of flight tracks for turbojet aircraft departing from Washington National Airport. The test, conducted by the Federal Aviation Administration (FAA) at the request of the Metropolitan Washington Council of Governments, took place from October 24, 1983, through January 7, 1984. Volume 1 presents analysis of data collected in the course of the test. Volume 2, the Technical Appendix, consists of a compilation of field sheets, survey forms, and details of the field noise measurement program and the community attitudinal survey. The purpose of this report is to present the data collected during the test for the information of and interpretation by the interested public. The report does not include conclusions or recommendations on maintaining or changing the flight paths at Washington National Airport. GRA

N85-17670# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.
NOISE MEASUREMENT FLIGHT TEST FOR BOEING VERTOL 234/CH 47-d HELICOPTER: DATA/ANALYSES
J. S. Newman, T. L. Bland, and K. R. Beattie Sep. 1984 195 p
(AD-A148172; FAA/EE-84-7) Avail: NTIS HC A09/MF A01 CSCL 20/1

This report documents the results of a Federal Aviation Administration (FAA) noise measurement flight test program with the Boeing-Vertol CH-47D helicopter. The report contains documentary sections describing the acoustical characteristics of the subject helicopter and provides analyses and discussions addressing topics ranging from acoustical propagation to environmental impact of helicopter noise. This test program was designed to address a series of objectives including: (1) acquisition of acoustical data for use in assessing heliport environment impact, (2) documentation of directivity characteristics for static operations of helicopters, (3) establishment of ground-to-ground and air-to-ground acoustical propagation relationships for helicopters, (4) determination of noise event duration influences on energy dose acoustical metrics, (5) examination of the differences between noise measured by a surface mounted microphone and a microphone mounted at a height of four feet (1.2 meters), and (6) documentation of noise levels acquired using international helicopter noise certification test procedures. GRA

N85-17671# Naval Surface Weapons Center, White Oak, Md. Materials Div.
ESTIMATE OF SOUND ABSORPTION DUE TO MAGNETOELASTIC INTERACTIONS Final Report
Kurt P. Scharnhorst 22 Mar. 1984 51 p
(AD-A148216; NSWC/TR-84-226) Avail: NTIS HC A04/MF A01 CSCL 20/1

Estimates of sound absorption by means of magnetoelastic induction of conduction currents are given. Two examples are analyzed: (1) Induction of eddy currents by means of magnetoelastic coupling between a viscoelastic absorber and a conducting ground plane, and (2) Induction of eddy currents in an electrically conducting viscoelastic material in a uniform magnetic field. We conclude that significant occurs only if the average magnetic field energy density and the mechanical kinetic energy density given by the product of the mass density and the square of the speed of sound in the material are comparable magnitude. GRA

N85-17672# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.
NOISE MEASUREMENT FLIGHT TEST: DATA-ANALYSES AEROSPATIALE AS 350D ASTAR HELICOPTER
J. S. Newman, E. J. Rickley, K. R. Beattie, and T. L. Bland Sep. 1984 175 p
(AD-A148496; FAA/EE-84-05) Avail: NTIS HC A08/MF A01 CSCL 20/1

This report documents the results of a Federal Aviation Administration (FAA) noise measurement flight test program with the AStar helicopter. The report contains documentary sections describing the acoustical characteristics of the subject helicopter and provides analyses and discussions addressing topics ranging from acoustical propagation to environmental impact of helicopter noise. This program was designed to address a series of objectives including: (1) acquisition of acoustical data for use in assessing heliport environmental impact, (2) documentation of directivity characteristics for static operation of helicopters, (3) establishment of ground-to-ground and air-to-ground acoustical propagation relationships for helicopters, (4) determination of noise event duration influences on energy dose acoustical metrics, (5) examination of the differences between noise measured by a surface mounted microphone and a microphone mounted at a height of four feet (1.2 meters), and (6) documentation of noise levels acquired using international helicopter noise certification test procedures. GRA

N85-17673# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.
NOISE MEASUREMENT FLIGHT TEST: DATA-ANALYSES, SIKORSKY S-76A HELICOPTER
J. S. Newman, E. J. Rickley, T. L. Bland, and K. R. Beattie Sep. 1984 190 p
(AD-A148525; FAA/EE-84-6) Avail: NTIS HC A09/MF A01 CSCL 17/1

This report documents the results of a FAA noise measurement flight test program with the Sikorsky S-76 helicopter. It contains documentary sections describing the acoustical characteristics of the subject helicopter and provides analyses and discussions addressing topics ranging from acoustic propagation to environmental impact of helicopter noise. This report is the sixth in a series of seven documenting the FAA helicopter noise measurement program conducted at Dulles International Airport during the summer of 1983. The S-76 test program involved the acquisition of detailed acoustic, position and meteorological data. This test program was designed to address a series of objectives including: (1) acquisition of acoustic data for use in assessing heliport environmental impact; (2) documentation of directivity characteristics for static operation of helicopters; (3) establishment of ground-to-ground and air-to-ground acoustic propagation relationships for helicopters; (4) determination of noise event duration influences on energy dose acoustical metrics; (5) examination of the differences between noise measured by a surface-mounted microphone and a microphone mounted at a height of four feet; and (6) documentation of noise levels acquired using international helicopter noise certification test procedures. GRA

N85-17674# Naval Postgraduate School, Monterey, Calif.
EFFECT OF SEALANTS OF THE SOUND ABSORPTION COEFFICIENTS OF ACOUSTICAL FRIABLE INSULATING MATERIALS Technical Report, 1 Nov. 1983 - 30 Sep. 1984
J. L. Wayman and M. K. Lory Oct. 1984 15 p
(AD-A148541; NPS53-85-0004) Avail: NTIS HC A02/MF A01 CSCL 11/1

Acoustical friable insulating materials (AFIM), which often in the past contained asbestos, have been used for sound control since the mid 1930's. Because of their widespread use and the ease of fiber dissemination, friable asbestos materials are considered to be the major source of asbestos fiber contamination in the indoor environment. Encapsulation of asbestos materials with a commercial sealant product is one of several methods used to control potential asbestos exposure in rooms. A sealant product that preserves most of the acoustical properties of the material is preferred in this usage. AFIM sample materials were treated with 6 types of sealants and the effects on normally incident absorption

coefficients from 100 to 2500 Hz were measured using a fixed, dual-microphone technique. Penetrating type sealants were found to have a less detrimental effect on sound absorption than those of a bridging type. GRA

N85-17675# Department of the Navy, Washington, D. C.
A BROADBAND MATCHING NETWORK Patent Application
S. E. Spychalski, inventor (to Navy) Filed 11 Jun. 1984 7 p
(AD-D011406; US-Patent-Appl-SN-619436) Avail: NTIS HC A02/MF A01 CSCL 17/1

A broadband matching network for a Helmholtz resonator transducer is a series RL matching network capable of withstanding a high power level. The usable acoustic broadwidth is expanded to produce a symmetrical output over a broad frequency band. Author (GRA)

N85-17676# Pennsylvania State Univ., University Park. Applied Research Lab.
ACOUSTIC RADIATION FROM SINGLE AND DOUBLE RIBBED CIRCULAR CYLINDRICAL SHELLS
C. B. Burroughs, S. I. Hayek, J. E. Hallander, and D. A. Bostian 30 Mar. 1984 104 p
(Contract N00024-79-C-6043)
(AD-A148771; AD-E301534; ARL/PSU/TM-84-76) Avail: NTIS HC A06/MF A01 CSCL 20/1

Measurements of the acoustic radiation from single and double ribbed circular cylindrical shells were made on the NUSC Transducer Calibration Platform (TCP) in Lake Seneca, NY. Six different types of mechanical drives were used at each of three locations inside the inner shell. Measurements of the shell vibration and acoustic radiation were made with and without outer shells installed around the inner shell structure. For two types of drives, measurements were made with a pressure release layer installed between the inner and outer shell surfaces. Acoustic radiation measurements were made as a function of frequency from 20 to 5,000 Hz and as a function of observation direction at several frequencies for each shell and drive measurement configuration. Measured acoustic radiation data as a function of frequency have been processed. Analysis of the processed data is presented and discussed. It is shown that the location of the drive had a significant effect on the acoustic radiation. The outer shell reduced the acoustic radiation at shell resonant frequencies, but had little effect on other frequencies. The pressure release layer in the double shell had little effect on the acoustic radiation. GRA

N85-17677# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Technische Akustik.
AEROACOUSTICS AT THE DFVLR BRUNSWICK RESEARCH CENTER: A SURVEY ON RECENT AND CURRENT ACTIVITIES
Hanno Heller Aug. 1984 83 p refs Presented at 9th AAAF/GALF Colloq. d'Acoust. Aeron., Compiegne, France, 14-16 Nov. 1984
(DFVLR-Mitt-84-14) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 23,50

Basic and applied research and development projects pertaining to the noise of propeller driven planes and helicopters, to aeroacoustic specifics of wind tunnels, to airport noise and blast barriers, and to aerodynamically induced automobile noise are discussed. Planning of aeroacoustic projects is presented, and cooperation in national and international research and scientific committees is treated. Author (ESA)

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N85-17678# Royal Signals and Radar Establishment, Malvern (England).
EXPOSURE MODELLING OF PARTICLE BEAM LITHOGRAPHY
C. Broughton and V. J. Mifsud Aug. 1984 35 p refs
(AD-A147849; RSRE-MEMO-3690; BR93107) Avail: NTIS HC A03/MF A01 CSCL 20/8

A computer modeling system that uses a Monte Carlo method simulate exposure of sensitive resist layer with electrons or ions is presented. The screened Rutherford cross section is used to calculate the angular elastic scattering of the electrons and Bethe's continuous-slowing-down approximation estimates energy loss between scattering events. A universal scattering cross section describes the scattering events for the incident ions and the Lindhard, Scharff and Schiott and Bethe formulas are used to provide the electronic energy loss. The energy deposition profile generated by the program for a delta-function exposure is convoluted with a realistic incident beam shape (Gaussian or modified Gaussian) to produce latent images. These images are presented as equi-energy contour plots or three dimensional surfaces. Plots of the simulated particle trajectories are also presented. Author (ESA)

N85-17679# Yale Univ., New Haven, Conn. Dept. of Chemical Engineering.
COLLISIONAL ENERGY EXCHANGE IN POLYATOMIC MOLECULES Final Report, 21 Aug. - 30 Dec. 1983
S. B. Ryali and J. B. Fenn 30 Dec. 1983 5 p
(Contract F49620-83-K-0017)
(AD-A147710; AFOSR-84-0901TR) Avail: NTIS HC A02/MF A01 CSCL 20/8

Fourier Transform Infrared Spectrometry (FTIS) has been used to study several kinds of gas-gas and gas-surface collision processes brought about with and in supersonic free jets in vacuo. Following are some key results: (1) Terminal distributions of rotational energy in free jets of carbon monoxide and carbon dioxide show a non-Boltzmann distribution that can be characterized by a two-temperature model and explained in terms of competition between rotation-rotation and rotation translation transfers. (2) Spectra of CO2 molecules excited by collisions with nitrogen molecules indicated similar two-temperature distributions, possibly due to secondary collisions between excited CO2 and N2. (3) The accommodation of vibrational and rotational energy during collisions between CO, CO2 and NO molecules and hot platinum surfaces has been determined over a range of surface temperatures. (4) Excess internal energies have been determined in nascent CO and CO2 molecules formed respectively by catalytic oxidation of C and CO on a platinum surface. An energy balance indicates that about 1/3 of the available reaction energy is absorbed by the surface, the remainder going mostly into vibrational modes of product molecules. GRA

N85-17680# Massachusetts Inst. of Tech., Cambridge. Center for Materials Science and Engineering.
STRUCTURE-PROPERTY RELATIONSHIPS IN INTERCALATED GRAPHITE Final Report, 1 Oct. 1982 - 30 Sep. 1984
M. S. Dresselhaus and G. Dresselhaus 15 Oct. 1984 26 p
(Contract F49620-83-C-0011)
(AD-A147949; AFOSR-84-1019TR) Avail: NTIS HC A03/MF A01 CSCL 20/8

Experimental and theoretical studies have been carried out relevant to the structural, lattice electronic, magnetic and superconducting properties of synthetic metals prepared by intercalating graphite. New synthesis methods have been developed for preparing magnetic transition metal chloride and potassium-hydrogen graphite interaction compounds. The use of ion implantation to enhance intercalation has been explored and promising results have been obtained. Structural studies using high resolution X-ray scattering and transmission electron microscopy have been applied to study two-dimensional structural phase transitions such as the commensurate to incommensurate stripe phase transition in bromine intercalated graphite and the commensurate to glass phase transition in antimony pentachloride intercalated graphite. The construction of a Raman microprobe allows study of the spatial homogeneity (to 2 micron resolution) of the staging in specific intercalated graphite samples. Electrical and thermal transport studies have been carried out, providing new information on the dominant scattering mechanisms. The high field magnetoresistance anomaly in graphite identified with a charge density wave has

been further explored with particular emphasis given to the role of impurities in pair breaking phenomena and pulsed electric fields in non-linear non-ohmic effects. Experimental and theoretical studies of two-dimensional magnetic phenomena have been successfully carried out in magnetic intercalation compounds.GRA

N85-17681# California Univ., San Diego. Inst. for Pure and Applied Physical Sciences.
INSTRUMENTATION FOR PARTICLE-BEAMS RESEARCH USING LASER EXCITED MERGING BEAMS Annual Report, 25 Jun. 1983 - 24 Jun. 1984
R. H. Neynaber and S. Y. Tang 24 Aug. 1984 10 p
(Grant AF-AFOSR-0242-83)
(AD-A147968; AFOSR-84-1067TR) Avail: NTIS HC A02/MF A01 CSCL 20/8

A summary of research performed under AFOSR Grant No. 83-0242 is given. The review describes molecular-beam studies of ion-pair production and measurements of the fraction of excited Na atoms, f*, in a composite beam of ground-state and excited Na atoms. The actual ion-pair production reactions studied are the following: Na + Br yield Na(+) + B(-), Na + I2 yield Na(+) + I2(-), Na(Na*) + Na yield Na(+) + Na(-), and Li + Na yield Li(-) + Na(+). The reaction Na + I2 yield Na(+) + I2(-) was used to measure f*. A value of about 6% was obtained. The work was performed using instrumentation provided by the grant. GRA

N85-17682# Iowa Univ., Iowa City.
THEORETICAL ISSUES INVOLVING TRAPS FOR NEUTRAL SPIN-POLARIZED ATOMS Annual Summary Report, 15 Nov. 1983 - 14 Nov. 1984
William C. Stwalley 15 Nov. 1984 12 p
(Contract N00014-83-K-0646; NR Proj. 407-012)
(AD-A148035; ASR-1) Avail: NTIS HC A02/MF A01 CSCL 20/8

The purpose of this project was to theoretically study and design a laser trap for neutral atoms. At low atomic densities, such a trap could be used to address a number of fundamental questions, e.g., the interaction of an individual atom with an electromagnetic field, collision dynamics, recombination. In particular, after examining a variety of laser-magnet trap concepts, we studied the feasibility and limitations of a corner cube laser trap for potassium atoms based on a near-resonant CW TEM sub 01 (doughnut mode) alexandrite laser beam with cooling provided by He4 atoms at approx. 1.5 K and designed initial experiments.GRA

N85-17683# Arizona Univ., Tucson. Dept. of Physics and Optical Science Center.
TIME-OF-FLIGHT SPECTROSCOPY OF IONIC AND METASTABLE FRAGMENTS FROM DISSOCIATING MOLECULES Annual Technical Report, 15 Jun. 1983 - 14 Jun. 1984
W. E. Lamb, Jr. and L. C. McIntyre, Jr. 25 Sep. 1984 11 p
(Grant AF-AFOSR-0218-80)
(AD-A148068; AFOSR-84-1021TR) Avail: NTIS HC A02/MF A01 CSCL 20/7

Progress is reported on research involving dissociation of molecules by electron bombardment. Time-of-flight techniques are used to determine the velocity distribution of metastable and ionic fragments. One recently completed experiment involved detection of proton fragments from dissociation of the hydrogen halides in the electron bombardment energy range of 20-60 electron volts. Threshold bombarding energies were obtained for several features in the proton velocity spectrum, and several of these features were identified as resulting from dissociation of molecular ions with a particular inner electron orbital hole. Other experiments described are: (1) an unsuccessful attempt to detect protons from the electron bombardment dissociation of the hydrogen molecular ion; (2) an ongoing attempt to detect, in coincidence, metastable and ionic fragments from dissociation of hydrogen; and (3) an experiment on proton fragments from the dissociation of water and hydrogen sulfide. GRA

N85-17684# Mission Research Corp., Albuquerque, N. Mex.
BEAM PROPAGATION STUDY: STABILIZATION OF THE RESISTIVE HOSE INSTABILITY IN INTENSE ELECTRON BEAMS Final Report, 1 Jul. 1983 - 30 Apr. 1984
R. J. Adler, G. F. Kiuttu, and R. J. Richter-Sand Aug. 1984 46 p
(Contracts F49620-83-C-0128; F29601-83-C-0050)
(AD-A148071; AMRC-R-598; AFOSR-84-0923TR) Avail: NTIS HC A03/MF A01 CSCL 20/8

A series of experiments has been performed to investigate the effect of unidirectional beam particle rotation on the resistive hose instability. Using the 4 MV, 100 kA, IBEX accelerator in a foil diode configuration, hose growth for hollow, partially hollow, and non-rotating Bennett profile beams was investigated. We found that partially hollow, rotating beams were most stable. In particular, they were more stable than non-rotating Bennett profile beams both in terms of the growth rate in per cm and in the growth per betatron wavelength. The observed reduction in instability growth rate per betatron wavelength over Bennett profile beams was a factor of 2.5. Stable propagation for >6 betatron wavelength (the full experiment length) was observed in some shots where the beam was well aligned. Broadened return current profiles and long plasma decay times were also observed, consistent with our present understanding of high current mode propagation. GRA

N85-17685# Naval Research Lab., Washington, D. C. Beam Dynamics Program.
NON-LINEAR TRANSVERSE ELECTRON BEAM DYNAMICS IN A MODIFIED BETATRON ACCELERATOR Interim Report
C. A. Kapetanakos and S. J. Marsh (Sachs/Freeman Associates, Inc., Bowie, Md.) 30 Nov. 1984 47 p
(AD-A148106; NRL-MR-5387) Avail: NTIS HC A03/MF A01 CSCL 20/7

The transverse electron beam dynamics in a modified betatron accelerator is studied using a new approach. This approach is based on the two exact constants of the motion and the potentials at the center of the beam. The main advantage of the present technique is that the ring orbits can be accurately determined over the entire minor cross-section of the torus and not only near the minor axis. Results indicate that the electron ring orbits, in the plane transverse to the toroidal magnetic field, always close inside the vacuum chamber and their topology is often substantially different than that predicted from the linear theory. Author (GRA)

N85-17686# Delaware Univ., Newark. Dept. of Chemistry.
MOLECULAR DYNAMICS IN NITRAMINES AND MODIFIED NITRAMINES Annual Report, 1 Oct. 1982 - 30 Sep. 1983
T. B. Brill Nov. 1983 11 p
(Grant AF-AFOSR-0285-80)
(AD-A148515; AFOSR-84-1073TR) Avail: NTIS HC A02/MF A01 CSCL 07/3

The structure of RDX has been compared by the use of Fourier transform infrared spectroscopy in the gas phase, melt phase, solution phase, and the solid Beta and alpha phases. The gas, melt, and solid Beta-RDX phases have not been studied previously. The RDX molecule has essentially C sub 3V molecular structure in all environments except the stable solid Alpha-RDX phase. The RDX and HMX melts were found to be comprised almost entirely of intact nitramine molecules, but decomposition before melting was directly detected in HMX. RDX was found to be a highly flexible molecule. In keeping with this flexibility, the crystal structure of the complex between RDX and sulfolane revealed NN02 groups frozen in axial, equatorial, and planar positions within one molecule. The crystal structure of AZMTTC was determined and its thermal decomposition mechanism empirically reasoned. HN3, not previously recognized as a product, appears to trigger the decomposition of AZMTTC. Copious amounts of N2O and CH2O are then released due to depolymerization of the ring. The IR spectra of the gas and solid phases and the TGA all support this mechanism. GRA

N85-17687# Missouri Univ., Rolla. Dept. of Physics.
THEORETICAL STUDIES OF RYDBERG ATOM COLLISIONS Final Report, 1 Mar. 1979 - 30 Sep. 1984

R. E. Olson 28 Nov. 1984 18 p
(Contract N00014-81-K-0538)
(AD-A148558) Avail: NTIS HC A02/MF A01 CSCL 20/8

Theoretical studies were performed on a variety of topics related to collisions involving Rydberg atoms. Progress was made towards the understanding of ion-Rydberg atom, Rydberg atom-Rydberg atom, and ground state atom-Rydberg atom collisions. A strong dc electric field was incorporated in calculations of electron capture and ionization cross sections for ion-Rydberg atom collisions. Electron capture collisions in the presence of a strong laser field were also investigated. GRA

N85-17688# Naval Research Lab., Washington, D. C.
ACCELERATION OF AN ELECTRON RING IN A MODIFIED BETATRON WITH TRANSVERSE PRESSURE
J. M. Grossman, J. M. Finn, and W. M. Manheimer 6 Dec. 1984 34 p
(AD-A148626; NRL-MR-5444) Avail: NTIS HC A03/MF A01 CSCL 20/7

An analytic and numerical scheme is developed to follow the adiabatic evolution of a beam with non-zero transverse pressure in a modified betatron. These calculations are made using improvements to previous zero pressure models in regimes where, as before, the poloidal inertia is ignored. The evolution of the beam is determined as a series of time independent equilibria with pressure appearing in our fluid approach as a gradient in the fluid equations of motion. The evolution of the pressure during adiabatic acceleration is determined by kinetic theory. The series of equilibria are then characterized by the constant number of particles within a drift (P sub theta) surface, the conserved toroidal flux inside a P sub theta surface, and the self-consistently evaluated pressure distribution (from magnetic moment conservation.) As in the case of zero pressure, it is found that the beam makes a transition from diamagnetic to paramagnetic orbits when it reaches a certain energy, and that the transition manifests itself by a change in the topology of the P sub theta surfaces during acceleration. As compared to our zero pressure results, it is found that the poloidal drift of the beam is significantly faster, so that measurement of this rotation frequency is a possible diagnostic for pressure. Despite the faster drift, however, the paramagnetic transition occurs at about the same energy in both cases. Finally it is observed that the higher polodial drift frequency associated with this pressure forces the beam toward the Brillouin limit much sooner than in the cold beam case, and that contrary to simple estimates, the pressure increases rather than decreases during acceleration due to a coupling between toroidal and poloidal motion. GRA

N85-17689# Naval Research Lab., Washington, D. C.
SIMM1: A LINEARIZED PARTICLE CODE
G. Joyce and M. Lampe 30 Nov. 1984 35 p
(ARPA Order 4395)
(AD-A148627; NRL-MR-5488) Avail: NTIS HC A03/MF A01 CSCL 09/2

SIMM1 is a linearized particle simulation code used to study the resistive hose instability of a self-pinched, relativistic electron beam propagating in resistive plasma. The code treats the zero-order axisymmetric beam dynamics as a group of macroparticle rings. The particle dynamics associated with the hose perturbations is represented by linearized displacements of these rings from the beam axis and by bunching of the charge density around the ring. The linearization procedure presents difficulties which must be dealt with to determine the long-time behavior of the system. The axisymmetric motion of the rings occurs under the influence of an anharmonic central potential which leads to secular behavior of the orbit perturbations. We have developed a method of course graining to deal with the problem of secularities. GRA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N85-17690*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A T-MATRIX THEORY OF GALACTIC HEAVY-ION FRAGMENTATION
John W. Norbury, Lawrence W. Townsend, and Philip A. Deutchman Jan. 1985 29 p refs
(NASA-TP-2363; L-15833; NAS 1.60:2363) Avail: NTIS HC A03/MF A01 CSCL 03B

The theory of galactic heavy ion fragmentation is furthered by incorporating a T matrix approach into the description of the three step process of abrasion, ablation, and final state interations. The connection between this T matrix and the interaction potential is derived. For resonant states, the substitution of complex energies for real energies in the transition rate is formerly justified for up to third order processes. The previously developed abrasion-ablation fragmentation theory is rederived from first principles and is shown to result from time ordering, classical probability, and zero width resonance approximations. Improvements in the accuracy of the total fragmentation cross sections require an alternative to the latter two approximations. A Lorentz invariant differential abrasion-ablation cross section is derived which explicitly includes the previously derived abrasion total cross sections. It is demonstrated that spectral and angular distributions can be obtained from the general Lorentz invariant form. R.S.F.

N85-17691# Oak Ridge National Lab., Tenn. Information Research and Analysis Section.
INTERAGENCY PROGRAM ON SPACE NUCLEAR POWER: DIRECTORY OF PARTICIPANTS IN THE SP-100 PROGRAM
C. C. Seaborn, comp. and H. A. Pfuderer, comp. Jan. 1985 25 p
(Contract DE-AC05-84OR-21400)
(DE85-026339; ORNL-6060) Avail: NTIS HC A02/MF A01

The names of individuals involved with the SP-100 project, which was established in 1983 to develop the technology necessary for space nuclear power systems, are listed herein. The listing, arranged alphabetically by the last name of individuals, also includes addresses and telephone numbers. An index of personnel sorted by affiliation is provided. Author

N85-17692# Analytic Sciences Corp., Reading, Mass.
PRELIMINARY POST-EMPLACEMENT SAFETY ANALYSIS OF THE SUBSEABED DISPOSAL OF HIGH-LEVEL NUCLEAR WASTE
M. F. Kaplan, C. M. Koplik, and R. D. Klett (Sandia Labs., Albuquerque, N. Mex.) Sep. 1984 66 p refs
(Contract DE-AC04-76DP-00789)
(DE84-011162; SAND-83-7106) Avail: NTIS HC A04/MF A01

The radiological hazard from the disposal of high-level nuclear waste within the deep ocean sediments is evaluated, on a preliminary basis, for locations in the central North Pacific and in the northwestern Atlantic. Radio-nuclide transport in the sediment and water column and by marine organisms is considered. Peak doses to an individual are approximately five orders of magnitude below background levels for both sites. Sensitivity analyses for most aspects of the post-emplacement systems models are included. B.G.

N85-17693# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany).
LIDAR-THOMSON SCATTERING Final Report
G. Brederlow (Max-Planck Inst. fuer Quantenoptik), J. E. Gruber, K. Hirsch (Stuttgart Univ.), H. Roher, H. Salzmannn (Stuttgart Univ.), and K. J. Witte (Max-Planck Inst. fuer Quantenoptik) Jun. 1984 160 p refs

(Contract JE-3/9009)
(IPP-1/299; IPF-84-3) Avail: NTIS HC A08/MF A01

A lidar Thomson scattering system for the Joint European Torus was designed. The time-resolved measurement of the backscattered light from a subnanosec laser enables spatial resolution via time-of-flight measurements. A spatial resolution of 12 cm is achieved using an iodine laser with microchannel plate (MCP) photomultipliers and a 1 GHz oscilloscope. For a 5 channel spectrometer a dynamic range of 0.7 to 15 keV can be achieved. The minimum statistical errors are reached at 5 keV. With a small, frequency-doubled test laser system the feasibility of 1 Hz operation over a sequence of 10 shots is demonstrated. A high-speed MCP photomultiplier is recommended. It is shown that stray light constitutes no problem for Thomson scattering experiments due to the good gating properties of the detector. Rayleigh scattering measurements for absolute calibration at 1 Torr hydrogen filling pressure should be possible. Author (ESA)

74 OPTICS

Includes light phenomena.

N85-17694 Northwestern Univ., Evanston, Ill.
OPTICAL WAVE PROPAGATION AND IMAGING IN THE ATMOSPHERE Ph.D. Thesis
Shuenn Jyi Wang 1984 173 p
Avail: Univ. Microfilms Order No. DA8423317

Since scintillation is an important parameter in system designs of optical communication, laser radar, and satellite imaging, the study of scintillation became essential and active after the invention of the laser. The closed-form result of scintillation was obtained by using the extended Huygens-Fresnel principle incorporating the source coherence properties, random medium effects, and receiver bandwidth. A simple model, which describes the random phase by a random shift and random tilt is used to characterize partially coherent sources. The scintillation results derived here are used to define the lower and upper bounds of the atmospheric transmittance. For imaging systems, it is found that the degradations of the modulation transfer function amd the signal-to-noise ratio are involved with the coherence length and the scintillation, respectively. Dissert. Abstr.

N85-17695 Oklahoma Univ., Norman.
OPTICAL FREQUENCY DOMAIN REFLECTOMETRY Ph.D. Thesis
Mehdi Shadaram 1984 116 p
Avail: Univ. Microfilms Order No. DA8423997

The optical frequency domain technique was used in the analysis of discrete and distributed reflections in an optical fiber. Reflections are studied in three different cases: discrete reflections only, distributed reflections only, and combination of discrete and distributed reflections. The signal to noise ratio (SNR) for the frequency domain technique was calculated. The time domain technique has shown an improvement of SNR by an average of 40 dB when frequency domain technique is used. When discrete and distributed reflections are combined, frequency domain method will be more efficient for detecting discrete reflections. The time domain technique, however, will be better choice for characterizing the fiber scattering loss and other distributed reflections. Ratio of distributed reflections to the discrete reflections power was calculated in order to determine the effect of some fiber parameters such as length, backscattering factor S, and scattering loss coefficient alpha (sub s) on the reflections. Dissert. Abstr.

N85-17696# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
ILL-POSED PROBLEMS AND REGULARIZATION ANALYSIS IN EARLY VISION
T. Poggio and V. Torre Apr. 1984 16 p
(Contract N00014-80-C-0505)
(AD-A147753; AI-M-773) Avail: NTIS HC A02/MF A01 CSCL 12/1

One of the best definitions of early vision is that it is inverse optics-a set of computational problems that both machines and biological organisms have to solve. While in classical optics the problem is to determine the images of physical objects, vision is confronted with the inverse problem of recovering three-dimensional shape from the light distribution in the image. Most processes of early vision such as stereomatching, computation of motion and all the structure from processes can be regarded as solutions to inverse problems. This common characteristic of early vision can be formalized: most early vision problems are ill-posed problems in the sense of Hadamard. It is shown that a mathematical theory developed for regularizing ill-posed problems lease in a natural way to the solution of early vision problems in terms of variational principles of a certain class. This is a new theoretical framework for some of the variational solutions already obtained in the analysis of early vision processes. It also shows how several other problems in early vision can be approached and solved. Author (GRA)

N85-17697# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
DETERMINING GRASP POINTS USING PHOTOMETRIC STEREO AND THE PRISM BINOCULAR STEREO SYSTEM
K. Ikeuchi, H. K. Nishihara, S. Magata, B. K. P. Horn, and P. Sobalvarro Aug. 1984 40 p
(Contracts N00014-77-C-0389; N00014-80-C-0505)
(AD-A147782; AI-M-772) Avail: NTIS HC A03/MF A01 CSCL 20/6

This paper describes a system which locates and grasps doughnut shaped parts from a pile. The system uses photometric stereo and binocular stereo as vision input tools. Photometric stereo is used to make surface orientation measurements. With this information the camera field is segmented into isolated regions of continuous smooth surface. One of these regions is then selected as the target region. The attitude of the physical object associated with the target region is determined by histogramming surface orientations over that region and comparing with stored histograms obtained from prototypical objects Range information, not available from photometric stereo is obtained by the PRISM binocular stereo system. A collision-free grasp configuration and approach trajectory is computed and executed using the attitude, and range data. Author (GRA)

N85-17698# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
DEGENERATE FOUR-WAVE MIXING LINESHAPES IN SODIUM VAPOR UNDER PULSED EXCITATION
Jeffrey H. Shapiro and Prem Kumar 1984 13 p
(Contract N00014-81-K-0662; ARPA Order 4258)
(AD-A148211) Avail: NTIS HC A02/MF A01 CSCL 20/6

Degenerate four-wave mixing (DFWM) lineshapes are investigated in sodium vapor near the D2 resonance line using nearly Fourier transform limited pulses. At low pump intensities sub-Doppler resolution is obtained. When the Rabi frequency associated with the pump intensity becomes equal to the ground state hyperfine frequency separation of sodium, each component of the double-peaked DFWM spectrum further splits into two components each. Adiabatic following model explains the near-resonant intensity dependence of the DFWM signal but is insufficient to explain the whole structure. Author (GRA)

N85-17699# University of Southern California, Los Angeles. Image Processing Inst.
NONLINEAR REAL-TIME OPTICAL SIGNAL PROCESSING Final Technical Report, 15 Apr. 1981 - 30 Jun. 1984
A. A. Sawchuk, T. C. Strand, and A. R. Tanguay, Jr. 1 Oct. 1984 90 p
(Grant AF-AFOSR-0182-81)
(AD-A148293; USCIPI-1130; AFOSR-84-1017TR) Avail: NTIS HC A05/MF A01 CSCL 20/6

This report summarizes the results of a research program in nonlinear real-time optical signal processing. The program began

April 15, 1981 and ended June 30, 1984. The research effort has centered on optical sequential logic systems and their use in digital optical computers, and on variable grating mode (VGM) liquid crystal spatial light modulators. As part of this study, parallel and twisted nematic liquid crystal light valve (LCLV) devices have been used as a nonlinear element in a feedback arrangement to implement a binary sequential logic system. A computer generated hologram fabricated on an e-beam system serves as a beamsteering interconnection element. A completely optical oscillator and frequency divider have been experimentally demonstrated, and various circuit interconnection techniques have been explored. Variable-grating mode (VGM) liquid crystal devices that perform local spatial frequency modulation as a function of the incident intensity have also been investigated. These devices can be used for nonlinear processing by selection and recombination of devices can be used for nonlinear processing by selection and recombination of these spatial frequency components. These devices have many interesting physical effects with useful applications in both analog and numerical optical signal processing. GRA

N85-17700# Wisconsin Univ., Madison. Dept. of Physics.
AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF OPTOGALVANIC EFFECTS Interim Report, 15 Jun. 1981 - 30 Sep. 1984
J. E. Lawler Oct. 1984 35 p
(Grant AF-AFOSR-0208-81)
(AD-A148456; AFOSR-84-1106TR) Avail: NTIS HC A03/MF A01 CSCL 09/1

Optogalvanic effects are changes in the conductance of a gas discharge caused by absorption of light via a bound state bound state transition of an atom or molecule. Optogalvanic effects of both signs are seen. Negative effects, which match a decrease in discharge conductance, are of special interests for application in pulsed power switching. Research on optogalvanic effects has resulted in: (1) a better understanding of the interaction of laser radiation and gas discharges, (2) the discovery of a mechanism for amplifying optogalvanic effects, and (3) the development of powerful new gas discharge diagnostics based on optogalvanic detection of Rydberg atoms. The amplified optogalvanic effects, which can be found in the cathode fall, constitute a promising area for further research. GRA

N85-17701# Wisconsin Univ., Madison.
INTERNATIONAL CONFERENCE ON LUMINESCENCE Final Technical Digest Report
W. M. Yen Oct. 1984 645 p Conf. held at Madison, Wis., 13-17 Aug. 1984
(Contract N00014-84-G-0053)
(AD-A148470) Avail: NTIS HC A99/MF A01 CSCL 20/6

This report presents the extended abstracts of papers presented at the International Conference on Luminescence 1984, held at the University of Wisconsin-Madison, August 13-17, 1984. Some of the reports presented information relating to: Luminescence of Insulators; Luminescence at Surfaces; Luminescence of Biological Material; Fractals and Fractors in Luminescence; Applications of Luminescence; Luminescence of Insulators; Electroluminescence; Nonlinear and Coherent Spectroscopies; Molecular Spectroscopy; Luminescence of Semiconductors; and Dynamics of Luminescence. GRA

N85-17702# Naval Research Lab., Washington, D. C.
GENERAL THEORY AND DESIGN CONSIDERATIONS FOR OPTICAL WAVEGUIDE CHEMICAL VAPOR SENSORS Progress Report, May 1982 - May 1983
J. F. Giuliani, H. Wohltjen, and N. L. Jarvis 7 Dec. 1984 17 p
(AD-A148505; NRL-MR-5457) Avail: NTIS HC A02/MF A01 CSCL 20/6

The development of small, portable and rugged devices for detecting low concentrations of toxic vapors has rapidly accelerated within the last several years due to advances in microfabrication and miniaturization techniques in optics and electronics. Moreover, the discoveries of solid organic film coatings exhibiting color change reactions to specific vapors, have made it possible to detect weak surface chemical reactions at the film-vapor interface by means of a multiple reflecting optical probe. A brief review of total multiple reflection and the application of two prototype devices built at NRL for the detection of low concentrations of ammonia and organophosphonate vapor is presented. Preliminary data characterizing both devices with regards to vapor response, reversibility, etc., will be discussed. Several design modifications are suggested to improve our devices. Author (GRA)

N85-17703# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
ON EDGE DETECTION
V. Torre and T. Poggio Aug. 1984 43 p
(Contract N00014-80-C-0505; Grant NATO 237.81)
(AD-A148573; AI-M-768) Avail: NTIS HC A03/MF A01 CSCL 20/6

Edge detection is the process that attempts to characterize the intensity changes in the image in terms of the physical processes that have originated them. A critical, intermediate goal of edge detection is the detection and characterization of significant intensity changes. This paper discusses this part of the edge detection problem. To characterize the types of intensity changes derivatives of different types, and possibly different scales, are needed. Thus, we consider this part of edge detection as a problem in numerical differentiation. We show that numerical differentiation of images is an ill-posed problem in the sense of Hadamard. Differentiation needs to be regularized by a regularizing filtering operation before differentiation. This shows that this part of edge detection consists of two steps, a filtering step and a differentiation step. We discuss recent results on the behavior and the information content of zero crossings obtained with filters of different sizes. These results imply a specific order in the sequence of filtering and differentiation operations. Topological properties are preserved by level-crossings. GRA

N85-17704# Department of the Navy, Washington, D. C.
MATRIX-MATRIX MULTIPLICATION USING AN ELECTROOPTICAL SYSTOLIC-ENGAGEMENT ARRAY PROCESSING ARCHITECTURE Patent Application
R. P. Bocker, H. J. Caulfield, and K. Bromley, inventors (to Navy) Filed 17 Feb. 1984 21 p
(AD-D011410; US-Patent-Appl-SN-581168) Avail: NTIS HC A02/MF A01 CSCL 20/6

An electrooptic systolic array architecture performs matrix-matrix multiplication using incoherent light. The incoherent light is collimated and passed through a polarizing beamsplitter and onto a pair of optically reflecting light valves. Each of the valves has a number of cells which are continuously being updated in a clocked sequence to vary their reflectivity in accordance with the data sequence. As the collimated incoherent light source is pulsed the reflectivity of the cells of the two light valves is reflected back through the polarizing beamsplitter and onto a photodetector array. The photodetector array senses the multiplied signals from the two valves and provides a representative output in the same time frame as the pulsed collimated light source. Another polarizing beamsplitter can be disposed to receive the multiplied signals from the first two valves and combined or multiplied with the input from yet another light valve which is, in turn, received by an additional photodetector array. This sequence can be repeated depending on the number of stages desired. A feedback capability is also provided for when iterative processing is desired.
Author (GRA)

N85-17705# Department of the Navy, Washington, D. C.
IMPROVED REAL-TIME ULTRA-HIGH RESOLUTION IMAGE PROJECTION DISPLAY USING LASER-ADDRESSED LIQUID CRYSTAL LIGHT VALVE Patent Application
J. Trias, inventor (to Navy) Filed 22 Aug. 1984 20 p
(AD-D011414; US-Patent-Appl-SN-643216) Avail: NTIS HC A02/MF A01 CSCL 14/5

This invention relates to large screen displays for presenting images to a number of viewers. More particularly this invention concerns a large screen display capable of operating in real-time

at high resolution rates and the presentation of video information. In still greater particularity this invention provides for an electronic driven acousto-optic modulation of a coherent beam and its acousto-optic deflection in the X-direction and Y-directon to enable higher resolution portrayal of information at video rates on a remote screen. GRA

N85-17706# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
LONG-TERM LIGHT INDUCED CHANGES IN DARK CONDUCTIVITY OF KAPTON
M. S. Leung, M. B. Tueling, and P. F. Mizera 28 Sep. 1984 38 p
(Contract F04701-83-C-0084)
(AD-A148791; TR-0084(4508-10)-1; SD-TR-84-41) Avail: NTIS HC A03/MF A01 CSCL 20/6

The light-induced increase in dark conductivity of Kapton in space and simulated space environments has been investigated. It was found that a long-term increase in conductivity is caused by an accumulation of electrically active centers generated by solar radiation in the bulk material, if maintained in a vacuum. An analysis of the increase in conductivity as a function of light exposure time indicates that the dark conductivity of Kapton can be raised to a level where the film can become sufficiently conductive to be antistatic by simply exposing it to solar radiation in orbit. GRA

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N85-17707*# Utah State Univ., Logan.
THE FLOW OF PLASMA IN THE SOLAR TERRESTRIAL ENVIRONMENT Semiannual Status Report, Jan. - Jun. 1984
R. W. Schunk Jun. 1984 16 p refs
(Grant NAGw-77)
(NASA-CR-174301; NAS 1.26:174301) Avail: NTIS HC A02/MF A01 CSCL 20I

The development of electric fields in an expanding plasma was studied. With regard to the polar wind, it was found that hot magnetospheric electrons have a pronounced effect on the polar wind. In addition, there is no O(+) charge exchange barrier and substantial fluxes of O(+) ions can escape with the polar wind. In the auroral plasma physics area, the excitation of electrostatic waves by field aligned auroral electron beams was examined. It was demonstrated that the auroral field aligned current density can be large enough to excite Buneman double layers. For situations that lead to strong double layers, it was shown that the temporal evolution of the potential profile is controlled by current fluctuations. Two dimensional particle in cell simulations were conducted, and the high frequency wave turbulence excited by an auroral electron beam of finite width perpendicular to an ambient magnetic field was investigated. The formation of V shaped auroral potential structures was studied, and numerical simulations of double layers and auroral electric fields were reviewed. R.S.F.

N85-17708# California Univ., Livermore. Lawrence Livermore Lab.
A RESEARCH PROPOSAL FOR THE THEORETICAL STUDY OF THE THERMODYNAMIC AND TRANSPORT PROPERTIES OF DENSE PLASMAS Final Report, 15 Jun. 1979 - 30 Sep. 1984
Forrest J. Rogers, H. E. DeWitt, and David B. Boercker 20 Nov. 1984 13 p
(Contracts N00014-80-F-0061; W-7405-ENG-48; NR Proj. 099-430)
(AD-A148040; AD-E850735; UCID-20265) Avail: NTIS HC A02/MF A01 CSCL 20/9

A basic theoretical study of the equation of state and transport properties of dense, partially ionized, reacting plasmas has been carried out. This report summarizes the work which is fully described in 14 journal articles, and reports. Topics include Dense Plasmas, Equation of State, Electrical Conductivity, Structure Factors, Pair Distribution Functions, Pseudopotentials, Effective Potentials, Partially ionized plasmas. GRA

N85-17709# Calspan Field Services, Inc., Arnold Air Force Station, Tenn.
MHD PERFORMANCE DEMONSTRATION EXPERIMENT, FY 1974 TO FY 1984 Final Report
G. L. Whitehead, L. S. Christensen, and R. J. Felderman AEDC Jun. 1984 190 p refs
(Contract DE-AI22-78ET-11417)
(DE85-000854; DOE/ET-11417/20) Avail: NTIS HC A09/MF A01

A national program for the development of commercial, open-cycle, magnetohydrodynamic (MHD) power generation is described. The emphasis of that national program was, and is, on establishing the engineering feasibilty of using coal to fuel the MHD power system. In order to establish feasibility it was necessary to experimentally demonstrate that an MHD generator system simulating a commercial-sized device can convert 16 to 18% of the available thermal energy into electric power at an isentropic efficiency of 60 to 70%. A presidential decree encouraged any government agency which might possess an organic MHD capability to assist ERDA in formulating and executing the national program. Since the largest MHD facility in the United States was located at the Arnold Engineering Development Center (AEDC), it was selected to be the national program element to demonstrate performance. As a result, the AEDC has been under contract since December 1973 (first to ERDA, later to its successor, the department of Energy, DOE) to modify existing equipment and to design, fabricate, and install new hardware to perform the MHD Performance Demonstration Experiment. The MHD facility is described and all results achieved to date are summarized. DOE

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N85-17710 National Physical Lab., Teddington (England). Div. of Quantum Metrology.
A SUPERCONDUCTING QUANTUM CURRENT STANDARD
J. C. Gallop and W. J. Radcliffe Jun. 1984 12 p refs
(NPL-QU-67; ISSN-0309-3050) Copyright. Avail: Issuing Activity

It is suggested that if macroscopic quantum tunneling can be observed then a quantum current standard analogous to the Josephson voltage standard is attainable. A flux tunneling weak link would allow a measurement of the electronic charge in terms of an existing current standard, merely by measuring the frequency of emitted electromagnetic radiation from the current biased, flux tunneling junction. Author (ESA)

N85-17711*# Cincinnati Univ., Ohio. Dept. of Electrical and Computer Engineering.
SILICON SUPERLATTICES. 2: Si-Ge HETEROSTRUCTURES AND MOS SYSTEMS Final Report, 1 Sep. 1981 - 30 Apr. 1983
J. A. Moriarty 30 Apr. 1983 49 p refs
(Grant NAG1-204)
(NASA-CR-174287; NAS 1.26:174287) Avail: NTIS HC A03/MF A01 CSCL 20L

Five main areas were examined: (1) the valence-and conduction-band-edge electronic structure of the thin layer (< 11 A) silicon-superlattice systems; (2) extension of thin-layer calculations to layers of thickness > 11 A, where most potential experimental interest lies; (3) the electronic structure of thicker-layer (11 to 110 A) silicon superlattices; (4) preliminary calculations of impurity-scattering-limited electron mobility in the thicker-layer superlattices;

and (5) production of the fine metal lines that would be required to produce on MOS superlattice. B.G.

N85-17712*# National Aeronautics and Space Administration, Washington, D. C.
STUDIES ON ORGANIC SEMICONDUCTORS. 15: EFFECTS OF THE SUBSTITUENTS ON THE PHOTOCONDUCTIVITIES OF SUBSTITUTED ANTHRACENES
Akira Sugimoto, Shinji Kato, Hiroo Inoue, and Eiji Imoto Jan. 1985 11 p refs Transl. into ENGLISH from Nippon Kagaku Kaishi (Japan), no. 7, 1974 p 1299-1301 Transl. by The Corporate Word, Inc., Pittsburgh Original document prepared by Osaka Univ., Japan
(Contract NASw-4006)
(NASA-TM-77788; NAS 1.15:77788) Avail: NTIS HC A02/MF A01 CSCL 20L

The photocurrents of the substituted anthracenes, 1,5-diacetylanthracene (2), 1-acetylanthracene (3), 9-acetylanthracene (4), 1,5-dichloroanthracene (5), 1,5-diethylanthracene (6), 1,5-dimethoxyanthracene (7), 9-cyanoanthracene (8), and anthracene (1) were measured by using their surface type cells in nitrogen. The compounds of (1), (5), (6), (7), and (8) showed the photocurrent spectra which corresponded to the absorption spectra of their evaporated films. In the cases of (2) and (3), however, the anomalous photocurrent appeared in the threshold region of their absorption spectra. The appearance of the anomalous photocurrent was characteristic of anthracenes having the acetyl group at 1- and/or 5-position. The magnitude of the photocurrents of the 1,5-disubstituted anthracenes was similar to that of (1). The photocurrents of the monosubstituted anthracenes were smaller than that of (1). Among the monosubstituted anthracenes, the compound (4) showed no photocurrent under the same conditions. Contrary to the results obtained in the cases of phenazines, the photoconductivities of the anthracene derivatives became better in air. Author

N85-17713# Rome Air Development Center, Griffiss AFB, N.Y.
FORMATION OF A LIMITING COMPOSITION IN THE PREPARATION OF TERNARY 3-5 SEMICONDUCTORS BY THE VPE (VAPOR PHASE EPITAXY) HYDRIDE TECHNIQUE
T. E. Erstfeld and K. P. Quinlan Jun. 1984 17 p
(AD-A147639; RADC-TR-84-144) Avail: NTIS HC A02/MF A01 CSCL 20/12

A study was undertaken to improve the quality of epitaxial layers of GaxIn1-xAs semiconductors by adding a continuous hydrogen chloride (HC1) etch to the mixing zone of the reactor in the vapor phase epitaxy (VPE)-hydride technique. An unusual observation was noted when the partial pressure of HCl in the mixing zone was equal to or greater than .007 atm in the present study. At these partial pressures of HCl, only one ternary is formed and has a composition corresponding to Ga0.87zin0.13As. This phenomenon is explained with a mechanism based on the Langmuir's adsorption isotherm, where saturated HCl absorption occurs. The study shows that the net growth rates of layer formation changes from positive to negative values with increasing pressures of HCl in the mixing zone. GRA

N85-17714# Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOLID STATE RESEARCH Quarterly Technical Report, 1 Feb. - 30 Apr. 1984
A. L. McWhorter 15 May 1984 96 p
(Contract F19628-80-C-0002)
(AD-A147640; Rept-1984-2; ESD-TR-84-024) Avail: NTIS HC A05/MF A01 CSCL 20/12

This report covers in detail the solid state research work of the Solid State Division at Lincoln Laboratory for the period 1 February through 30 April 1984. The topics covered are Solid State Device Research, Quantum Electronics, Materials Research, Microelectronics, and Analog Device Technology. Funding is primarily provided by the Air Force, with additional support provided by the Army, DARPA, Navy, NASA, and DOE. Author (GRA)

N85-17715# International Business Machines Corp., San Jose, Calif.
ELECTRONIC STRUCTURE OF SEMICONDUCTOR INTERFACES Final Report, 1 Sep. 1979 - 31 May 1984
F. Herman 1 Nov. 1984 63 p
(Contract N00014-79-C-0814)
(AD-A147663) Avail: NTIS HC A04/MF A01 CSCL 20/12

This report concerns theoretical studies of the electronic structure of various types of interfaces, including (1) interfaces between different semiconductors, such as Ge and GaAs; (2) interfaces between semiconductors and insulators, such as Si and SiO2 (3) interfaces between metals and semiconductors, such as Pd2Si and Si; (4) interfaces between crystalline and amorphous semiconductors; and (5) interfaces between ferromagnetic and antiferromagnetic metals, such as Permalloy/MnFe and Co/Cr. The overall goal was to elucidate the inter-relationship between the atomic-scale structure of interfaces and their electronic, optical, and magnetic characteristics. For some of these systems, the effects of structural an chemical imperfectious on interfacial properties were taken into account explicitly. Theoretical results were related to relevant experimental information where possible. This Final general approach, the principal conclusions, and where the subject stands today. Additional information may be found in the six representative research papers and reviews that are reproduced in the Appendices. GRA

N85-17716# Northeastern Univ., Boston, Mass. Dept. of Physics.
ELECTRONIC PROPERTIES OF INTERCALATED GRAPHITE AND AMORPHOUS METALS Annual Report, 1 Jun. 1982 - 30 Sep. 1984
R. S. Markiewicz, S. W. McKnight, and C. L. Tsai 24 Oct. 1984 38 p
(Contract F49620-82-C-0076)
(AD-A147664; AFOSR-84-0971TR) Avail: NTIS HC A03/MF A01 CSCL 20/12

A general solution has been proposed to the problem of resolving the fundamental Fermi surface sections from magneto-oscillations in graphite acceptor compounds, allowing quantitative measure of charge transfer and c-axis screening. Direct observation of magnetic breakdown proves that large, in-plane superlattices are responsible for some of the extra oscillation frequencies, while domain formation in Br2-graphite reveals the strong magnetic interaction responsible for other frequencies. X-ray studies show the superlattices directly, and reveal a commensurate-incommensurate transition in H2SO4-graphite. In stage-1 AsF5-graphite, a discontinuous change of the magnetooscillations suggests a field-induced phase transition. Negative magneto-resistance in Ca-A1 metallic glasses has been attributed to localization effects. In La-A1 glasses the superconductivity has been used to separate localization and interaction effects in the normal state. In Ge-Fe, the metal-insulator transition shows an unusual dependence on concentration, perhaps related to its magnetic properties, while in Au:Fe, the Kondo effect is found to persist in films < 1000A thick. GRA

N85-17717# Wisconsin Univ., Madison. Dept. of Physics.
PHOTOEMISSION, VIBRATIONAL AND STIMULATED DESORPTION STUDIES OF METAL-SEMICONDUCTOR INTERFACES AND OF CHEMISORBED ATOMS AND MOLECULES Annual Report, 1 Oct. 1983 - 30 Sep. 1984
G. Margaritondo Oct. 1984 18 p
(Contract N00014-80-C-0908; RR0-1102)
(AD-A147709) Avail: NTIS HC A02/MF A01 CSCL 20/12

This program has produced in recent years a number of fundamental results on the microscopic properties of metal-semiconductor interfaces and on the mechanism of photon stimulated desorption. Both areas of research are of fundamental interest in condensed matter physics. Furthermore they have important applications in technology. The microscopic metal-semiconductor interface properties are directly related to the behavior and performance of the Schottky barrier, one of the building blocks of modern solid-state devices. This program

investigates the formation of metal-semiconductor interfaces with some of the most powerful surface-science experimental probes: photoemission spectroscopy with synchrotron radiation, Auger spectroscopy, low-energy electron defraction in high-resolution electron energy loss surface vibrational spectroscopy. The stimulated desorption process is potentially a good probe of the chemical properties of absorbed species, e.g., in catalytic systems. GRA

N85-17718# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
ELECTRONIC STRUCTURE, CHEMICAL BONDING, AND ELECTRON CONDUCTIVITY OF THIN-FILM TRANSITION-METAL SILICIDES Interim Report
K. H. Johnson and F. A. Leon 10 Sep. 1984 19 p
(Contract N00014-81-K-0499)
(AD-A147721; TR-8) Avail: NTIS HC A02/MF A01 CSCL 20/12

The local electronic densities of states and chemical bonding of thin-film palladium and molybdenum silicides are compared on the basis of embedded cluster molecular-orbital calculations. Composite Pd(d)-Si(p)-antibonding/Si(p)-Si(p)bonding character and composite Mo(d)-Si(p)nonbonding/Mo(d)-Si(d)bonding character at the respective Fermi energies are responsible for the different electrical conductivities of these silicide films and for the different Schottky barriers of the corresponding silicide/silicon systems. GRA

N85-17719# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Electronics Research Branch.
CHARACTERIZATION OF III-V COMPOUND SEMICONDUCTOR DEVICE MATERIALS Final Report, Oct. 1979 - Oct. 1983
D. C. Reynolds May 1984 41 p
(AF Proj. 2306)
(AD-A148203; AFWAL-TR-84-1032) Avail: NTIS HC A03/MF A01 CSCL 20/12

The objective of this task has been the electrical, optical, and magneto-optical characterization of the intrinsic and extrinsic properties of compound semi-conductors, primarily from the III-V group of materials. Photoluminescent techniques were used to identify both the intrinsic and extrinsic properties of the materials. Intrinsic properties such as energy band gaps, effective mass parameters, refractive indices, dielectric functions, exciton binding energies, and lattice vibration frequencies were determined. Extrinsic properties including activation energies of foreign impurities, binding energy of excitons to foreign impurities and the energies of complexes were established. Transport measurements were used to measure carrier mobilities and electrical conductivity as well as carrier concentrations. These measurements as a function of temperature make it possible to determine the number of donors and the number of acceptors and therefore the compensation ratio in the material. Local vibrational mode spectroscopy was used as a characterization tool to identify specific impurities such as C and Si in GaAs. From the vibrational energy the site location of the impurity can be determined. These characterization techniques have been very successful in evaluating the quality of materials and have been very helpful to the crystal growing programs which has been successful in growing very high quality materials. GRA

N85-17720# Lehigh Univ., Bethlehem, Pa. Materials Research Center.
CRYSTALLIZATION BEHAVIOR OF POLY(3,3-BIS (ETHOXYMETHYL) OXENTANE) AND POLY(3,3-BIS (AZIDOMETHYL) OXETANE)
K. E. Hardenstine, G. V. Henderson, Jr., L. H. Sperling, C. J. Murphy, and G. E. Manser (Thiokol Corp., Brigham City, Utah) 1984 41 p
(Contract N00014-82-K-0050)
(AD-A148271) Avail: NTIS HC A03/MF A01 CSCL 20/2

Two crystal modifications have been found for poly (3,3-bis (ethoxymethyl) oxetane), poly(BEMO), by wide-angle X-ray powder diffraction and differential scanning calorimetry while only one modification has been found for poly(3,3-bis(azido methyl) oxetane), poly(BAMO). Melting temperatures for the two polymers were nearly the same, varying from about 70 deg C to about 90 deg C depending on the thermal treatment; higher crystallization temperatures resulted in higher melting temperatures. The equilibrium melting temperature, T sub m, was found to be 125 deg C and 128 deg C for poly(BEMO) and poly(BAMO), respectively, using the Hoffman-Weeks extrapolation procedure. Measurement of the melting point depression of poly(BEMO) and poly(BAMO) in di-butyl phthalate yielded enthalpy of fusion values of 2.25 kcal/mole and 12.8 kcal/mole, respectively. The percent crystallinity for poly (BEMO) and poly(BAMO), respectively was calculated to be 55-60% and 13-30% based on DSC and X-ray analysis. GRA

N85-17721# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
CHARACTERIZATION OF THERMALLY TREATED GALLIUM ARSENIDE BY LASER-RAMAN AND AUGER SPECTROSCOPY Final Report, Mar. - Dec. 1983
N. T. McDevitt, W. L. Baun, and J. S. Solomon Oct. 1984 42 p
(AD-A148414; AFWAL-TR-84-4083) Avail: NTIS HC A03/MF A01 CSCL 20/2

Thermally treated (100) gallium arsenide crystals were characterized by Raman and Auger spectroscopy. Studies were carried out at intervals between 200 and 750 C. It was difficult to detect any oxide films at temperatures below 450 C by Raman spectroscopy. Films grown at 450 C were homogeneous and 240A thick. Both Raman and Auger spectroscopy indicate the films consist of gallium oxide and crystalline arsenic dispersed throughout the film. A white dense film was grown at 750 C and Raman data indicated it was primarily beta gallium oxide. GRA

N85-17722# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
CRYSTALLINE STRUCTURE OF UREA ICE SHEETS USED IN MODELING EXPERIMENTS IN THE CRREL TEST BASIN
A. J. Gow Sep. 1984 56 p
(DA Proj. 4A1-61101-A-91-D)
(AD-A148434; CRREL-84-24) Avail: NTIS HC A04/MF A01 CSCL 20/2

This report describes the growth characteristics and crystalline textures of urea ice sheets which are now used extensively in the Cold Regions Research and Engineering Lab. (CRREL) test basin for modeling sea ice. The aims of the report are to describe the different kinds of crystalline texture encountered in urea ice sheets and to show that even small variations in texture can drastically influence the mechanical behavior of urea ice sheets. Standard petrographic techniques for studying microstructure in thin sections were used on 24 urea ice sheets. These investigations entailed observations of the crystalline texture of the ice (including details of the subgrain structure), grain size measurements, and studies of the nature and extent of urea entrapment and drainage patterns in the ice. Increased knowledge of the factors controlling the crystalline characteristics of urea ice sheets has progressed to the point where test basin researchers at CRREL are now able to fabricate ice sheets with prescribed structures leading to predictable mechanical properties. GRA

N85-17723# Universal Energy Systems, Inc., Dayton, Ohio.
ION IMPLANTATION IN 3-5 COMPOUND SEMICONDUCTORS Final Technical Report, 1 Aug. 1980 - 31 Dec. 1983
P. P. Pronko, Y. K. Yeo, R. S. Bhattacharya, and A. K. Rai Sep. 1984 372 p
(Contract F33615-80-C-1108)
(AD-A148462; AFWAL-TR-84-1122) Avail: NTIS HC A16/MF A01 CSCL 20/12

The goal of this program was to address the basic and applied problems associated with: (1) ion implantation doping of GaAs, (2) device isolation by ion implantation in GaAs, and (3) Ohmic contact in GaAs. This report presents results of detailed investigation conducted by using various techniques. These results provide an understanding of the interactions of implanted ions with pre-implant impurities and nature of defects; the effect of

various annealing procedures an activation efficiency, profile distribution, lattice incorporation, and residual damage. A clear indication of the importance of defect complexes in ion implanted GaAs has resulted from this work. Formation of high resistivity layers in n-type GaAs be oxygen implantation has been demonstrated. Systematic studies have been performed to compare surface morphologies, compound formation and diffusion behavior of Au, Au-Ge, and Au-Ge-Ni on GaAs. Author (GRA)

N85-17724# Wisconsin Univ., Milwaukee. Dept. of Physics.
SHORT RANGE ORDER-LONG RANGE ORDER IN SUPERCONDUCTING MATERIALS Final Scientific Report, 1 Oct. 1980 - 30 Sep. 1984
M. Levy 5 Nov. 1984 29 p
(Grant AF-AFOSR-0002-81)
(AD-A148764; AD-E301534) Avail: NTIS HC A03/MF A01 CSCL 20/3

Surface waves propagating through NbN films which are columnar in nature and which therefore may behave like inhomogeneous two dimensional superconductors with localized electronic states show attenuation curves which yield an effective superconducting energy gap which saturates at about one third the usual value. A model has been proposed that ascribes this order parameter reduction to the localization of electronic states in the columnar regions. The piezoelectrically induced attenuation curve in a superconducting NbN film is shifted by almost 5 K below the resistivity curve of the film. This shift may be attributed to the resistance in the cores of the Kosterlitz-Thouless vortex-antivortex flux pairs which may exist in an inhomogeneous superconductor. A superconducting granular lead film has been investigated with surface acoustic waves propagating on the piezoelectric substrate. Most of the piezoelectrically induced attenuation in the normal state is quenched when the film becomes superconducting. The residual attenuation that remains in the superconducting state may be related to the fact that the surface acoustic wave samples the sheet resistivity of a small number of granules. GRA

N85-17725# Max-Planck-Inst. fuer Festkoerperforschung, Stuttgart (West Germany).
GALLIUM ARSENIDE/AlGaAs MULTILAYER STRUCTURES WITH SPECIAL DOPING PROFILES FOR MICROWAVE AND OPTOELECTRONIC DEVICES Final Report, Apr. 1983
Klaus Ploog, Harald Kuenzel, Juergen Kenecht, and Albrecht Fischer Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 82 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-207; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17

Molecular beam epitaxy (MBE) was used to prepare GaAs/AlxGa1-xAs multilayer semiconductor structures with special doping profiles normal to the surface. Investigations were performed on selectively doped n-AlxGa1-xAs/GaAs heterostructures with high-mobility 2-dimensional electron gas for application in field effect transistors having high switching speed or for precise determination of the electrical resistance using the quantized Hall effect; AlxGa1-xAs/GaAs quantum well heterostructures with adjustable emission wavelength for application in short-wavelength lasers with improved quantum efficiency; and GaAs doping superlattice with tunable electronic properties for application in novel devices as photodetectors of high sensivity, tunable lasers, and LEDs. Author (ESA)

N85-17726# Stuttgart Univ. (West Germany). Inst. fuer Netzwerk- und Systemtheorie.
THIN FILM TRANSISTORS FOR ADDRESSING FLAT PANEL DISPLAYS Final Report, Aug. 1983
Ernst Lueder, Traugott Kallfass, Wolfgang Frasch, Gilbert Moersch, Thomas Ruess, and Bernhard Schaible Bonn Bundesministerium fuer Forschung und Technologie Oct. 1984 152 p refs In GERMAN; ENGLISH summary Sponsored by Bundesnimisterium fuer Forschung und Technologie
(BMFT-FB-T-84-210; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32

Large matrix-addressed liquid crystal (LC) displays which are addressed by thin film transistors (TFT's) were manufactured by photolithographic techniques to avoid production problems of evaporation through metal masks. The components needed on the substrate are TFT's, storage capacitors, and x-and y-lines; they are manufactured by tantalum thin film technology with cadmium selenide as a semiconductor. Exact pattern generation is provided by self alignment of the essential masks. Contaminations stemming from the photolithographic steps are removed by sputter etching prior to the deposition of the next layer in the same vacuum. Even under inadequate clean room conditions displays with 32x36 pels of 1x1mm squared pel size are manufactured with the high pel yield of 99%. Author (ESA)

N85-17196# Joint Publications Research Service, Arlington, Va.
FRENCH RESEARCH ON GALLIUM ARSENIDE DEVICES
Y. Segui, B. Moret, and D. Montalan *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 23-36 refs Transl. into ENGLISH from Rev. de Phys. Appl. (Paris), Apr. 1984 p 325-331 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N85-17727# California Univ., Berkeley. Lawrence Berkeley Lab.
QUANTUM MONTE CARLO FOR MOLECULES Annual Summary Report, 1 Jan. - 31 Dec. 1984
W. A. Lester, Jr. and P. J. Reynolds 1 Nov. 1984 21 p
(Contract N00014-83-F-0101; RR0-1103)
(AD-A148159) Avail: NTIS HC A02/MF A01 CSCL 20/10

Research progress on an alternative method to variational and perturbative approaches for the electronic structure of molecules is described. Advances including (1) the first computation of a molecular excited state (CH2) and (2) best computed bound to the classical barrier to the hydrogen exchange reaction are described. GRA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N85-17728*# Texas Univ., Dallas.
A RESEARCH IN SUPPORT OF NASA'S SPACE SCIENCE Final Technical Report
W. B. Hanson Jan. 1985 4 p
(Grant NGL-44-004-130)
(NASA-CR-174267; NAS 1.26:174267) Avail: NTIS HC A02/MF A01 CSCL 05I

Thirty-nine papers on cosmic ray anisotropies, law energy auroral particles, helium and hydrogen airglow, ionospheric irregularities, thermospheric winds, interhemisphere ion transport, ion cyclotron heating, ion temperature morphology, ion chemistry, ion convection, and spacecraft interactions with the atmosphere and ionosphere are described. B.G.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N85-17729*# National Academy of Sciences - National Research Council, Washington, D. C. Commission on Engineering and Technical Systems.
SUMMARY OF ACTIVITIES OF AERONAUTICS AND SPACE ENGINEERING BOARD Technical Report, 1 Oct. - 31 Dec. 1984
Jan. 1985 6 p refs
(Contract NASw-4003)
(NASA-CR-174294; NAS 1.26:174294) Avail: NTIS HC A02/MF A01 CSCL 05A

Activities of the Aeronautics and Space Engineering Board (ASEB) are discussed with emphasis on space station engineering. B.G.

N85-17730*# National Aeronautics and Space Administration, Washington, D. C.
RESEARCH DONE AT DERAT (OCTOBER 1982 THROUGH SEPTEMBER 1983); SUMMARY OF PRINCIPAL RESULTS OBTAINED
Dec. 1984 87 p refs Transl. into ENGLISH of "Recherches effectues au DERAT (Octobre 1982 a Septembre 1983); Bilan des principaux resultats acquis" Toulouse, 17 Oct. 1983 42 p
(Contract NASw-4004)
(NASA-TM-77786; NAS 1.15:77786) Avail: NTIS HC A05/MF A01 CSCL 05A

The progress in the following areas is described: measurement equipment; F2 FAUGA wind tunnel tests; unsteady boundary layers; body and axisymmetrical boundary layers; wing fuselage interactions; turbulence; subsonic-transonic flow; cryogenic wind tunnel tests; and profile testing. Author

N85-17731# Massachusetts Univ., Amherst. Dept. of Electrical and Computer Engineering.
DECENTRALIZED CONTROL OF SCHEDULING IN DISTRIBUTED SYSTEMS Quarterly Report, 15 Mar. - 14 Jun. 1984
J. A. Stankovic 14 Jun. 1984 55 p
(AD-A147688) Avail: NTIS HC A04/MF A01 CSCL 09/2

This report summarizes the work performed during the 10th quarter of this contract, from March 15, 1984 to June 14, 1984. The work in this quarter concentrated in three areas: simulations of our real-time bidding algorithms, nontraditional architectures studies for real-time systems, and scheduling tasks with resource requirements in hard real-time systems. Section 2 of this report describes the progress made in each of these areas. Significant results have been obtained which provides insight into the effectiveness of the algorithm. An improvement over the basic algorithm has been found. The improvement uses the prediction of future surplus time instead of the current surplus time in modifying bids. This report describes the basic algorithm and then describes the simulation results. GRA

N85-17732# Louisiana State Univ., Baton Rouge. Dept. of Quantitative Business Analysis.
PRODUCTION RATE VARIATIONS COST MODELS Final Report, 1 Jun. - 14 Aug. 1984
T. R. Gulledge, Jr. 14 Aug. 1984 17 p
(Contract F49620-82-C-0035)
(AD-A147708) Avail: NTIS HC A02/MF A01 CSCL 14/1

This research examines a model that may be used to estimate the cost impact of production rate changes on a timely and real world basis. Part 1 analyzes current models that are being implemented by Air Force Systems Command, and demonstrates that these models are deficient in their theoretical definition and empirical construction. Part 2 presents current status of the development of a more realistic rate variations model for the F-16 aircraft program. GRA

N85-17733# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN ANALYSIS OF PRODUCTION COMPETITION AND AWARD METHODOLOGY M.S. Thesis
G. T. Sparrow and J. A. Stevens Sep. 1984 129 p
(AD-A147775; AFIT/GLM/LSM/84S-60) Avail: NTIS HC A07/MF A01 CSCL 05/1

The injection of competition into the production phase of an acquisition is an important issue in todays defense acquisition environment. Developing a second production source is the primary means of achieving this type of competition. Various techniques to accomplish production competition have been used with mixed results. This thesis reviews the theoretical basis for and the Government's policy reguarding production competition along with the determination of second source applicability to a given program. In addition, this work reviews five methods of developing a second source, along with five methodologies for determining the award between two sources. After the award methodologies are discussed, one method (the Solinsky Technique) was chosen for a more indepth analysis. GRA

N85-17734# General Accounting Office, Washington, D. C. National Security and International Affairs Div.
EXCESSIVE AIR FORCE INVENTORIES RESULT FROM DUPLICATIVE SPARE PARTS REQUIREMENTS
25 Oct. 1984 24 p
(AD-A147777; GAO/NSIAD-85-7) Avail: NTIS HC A02/MF A01 CSCL 15/5

The Air Force manages, buys, and stocks spare parts at five logistics centers/depots to support Air Force weapons systems. The five logistics centers manage consumable parts valued at over $3 billion. Each depot also operates a maintenance activity to repair weapons systems and their components. This report contains recommendations for eliminating duplicative depot maintenance requirements from spare parts inventories. Programming logic used to compute total Air Force consumable spare parts requirements results in some depot maintenance requirements being counted twice. As of March 31, 1983, the Air Force was investing $119 million in unnecessary inventory because of this duplication and about $21.5 million annually in maintaining this inventory. GRA

N85-17735# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
COST-PLUS-PERCENTAGE-OF-COSTS IN GOVERNMENT CONTRACTS M.S. Thesis
S. J. Roser Sep. 1984 143 p
(AD-A147779; AFIT/CI/NR-84-83T) Avail: NTIS HC A07/MF A01 CSCL 05/1

Cost-percentage-of-cost (CPPC) is a method of contracting or a type of contract under which the contractor is not only reimbursed his performance costs but is also paid a stated percentage of his cost. World War I wrought havoc on traditional Government procurement practices. The tremendous demand for war production, along with volatile labor and material prices, dictated a relaxing of the customary fixed price system of acquisition. Competitive bidding and fixed price contracts proved untenable because, not only did many contractors refuse to bid for war production contracts on a lump sum basis, those that did often factored in exorbitant contingencies. CPPC appeared to be the answer to Government prayer, since it seemed to solve the problem of reluctant or unventuresome contractors. Perhaps it was also apropos for that unsettled era, but in any event, CPPC soon became a virtual cornerstone of Government acquisition! GRA

N85-17736# Massachusetts Inst. of Tech., Cambridge.
AUTONOMY IN THE INDUSTRIAL R AND D LAB Interim Technical Report
Lotte Bailyn Oct. 1984 47 p
(Contract N00014-80-C-0905; NR Proj. 170-911)
(AD-A148075; TR-30-ONR) Avail: NTIS HC A03/MF A01 CSCL 05/1

This paper distinguishes between strategic autonomy (the freedom to set one's own research agenda) and operational

autonomy (the freedom, once a problem has been set, to attack it by means determined by oneself, within given resource constraints). The paper argues, and presents preliminary corroborating data, that the optimal position for the start of careers in the R&D lab is to be low on strategic but high on operational autonomy. Most labs, however, seem to espouse a philosophy of strategic autonomy. This confusion between strategic and operational autonomy creates dilemmas and contradictions in the technical career areas. GRA

N85-17737# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
OUTLOOK FOR EXPANDING THE FEDERAL RESEARCH IN PROGRESS SYSTEM
22 Oct. 1984 23 p
(AD-A148354; GAO/RCED-85-15) Avail: NTIS HC A02/MF A01 CSCL 05/1

A study of the Federal government's research and development (R&D) efforts in the areas of new materials, electronic devices, and biotechnology was requested. There is concern about the lack of a central source of information on federal funding for these technologies and requested that GAO study the system that federal agencies use to catalogue ongoing R&D projects. GAO focused a review on the National Technical Information Service's (NTIS) Federal Research in Progress System (FEDRIP) and how the information systems of the major federal R&D agencies relate to FEDRIP. The overall objective was to review the outlook for making FEDRIP a comprehensive source of information on government-funded R&D. A more detailed description of the objectives, scope, and methodology is contained in enclosure 1. An expansion of FEDRIP could be difficult to achieve. To make FEDRIP a comprehensive R&D data base, all applicable agencies would have to report both project and funding information to NTIS. Such a change would not necessarily make it easier to determine overall federal funding levels for particular areas of technology. Budget information and congressional correspondence is included. GRA

N85-17738# Research Inst. of National Defence, Stockholm (Sweden).
DECISION MAKING IN STRESSFUL CONDITIONS: A MODEL BASED ON THE COPING PERSPECTIVE
Gerry Larsson and Bengt Starrin Aug. 1984 32 p refs
(FOA-C-55064-H3; ISSN-0347-7665) Avail: NTIS HC A03/MF A01

A model of decision making in stressful conditions was developed by elaborating the Janis-Mann model to make it fit the more general stress and coping theory. The importance of the goal hierarchy of the decision maker, at all levels of awareness, is brought into a fuller consideration. The kinds of emotions elicited by different kinds of cognitive appraisals during different stages of the decision making process are specified. The role of emotion-focused coping in taking care of these emotions is emphasized. The interdependence of problem and emotion-focused coping is elaborated and specific combinations are related to different coping patterns in decision making. Methodological suggestions for empirical studies of the model are offered. Author (ESA)

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N85-17739*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SPANISH LANGUAGE EQUIVALENTS FOR A GLOSSARY OF TERMS USED IN THE FIELD OF SPACE EXPLORATION
G. D. Bullock Jun. 1982 120 p
(NASA-TM-87403; X-602-82-11; NAS 1.15:87403) Avail: NTIS HC A06/MF A01 CSCL 05B

A listing of terms employed in the fiel of space exploration is provided along with Spanish language equivalents. Definitions of the terms are provided in English. R.S.F.

N85-17740*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SCIENTIFIC AND TECHNICAL INFORMATION OUTPUT OF THE LANGLEY RESEARCH CENTER FOR CALENDAR YEAR 1984
Jan. 1985 247 p
(NASA-TM-86336; NAS 1.15:86336) Avail: NTIS HC A11/MF A01 CSCL 05B

The scientific and technical information that the Langley Research Center produced during the calendar year 1984 is compiled. Approximately 1650 citations are included comprising formal reports, quick-release technical memorandums, contractor reports, journal articles and other publications, meeting presentations, technical talks, computer programs, tech briefs, and patents. M.G.

N85-17741*# Business and Technological Systems, Inc., Seabrook, Md.
RESULTS OF DATA BASE MANAGEMENT SYSTEM PARAMETERIZED PERFORMANCE TESTING RELATED TO GSFC SCIENTIFIC APPLICATIONS
Carol H. Carchedi, Thomas L. Gough, and Herbert A. Huston 30 Jun. 1983 250 p
(Contract NAS5-26728)
(NASA-CR-170615; NAS 1.26:170615; BTS2-82-45/rd-1021) Avail: NTIS HC A11/MF A01 CSCL 05B

The results of a variety of tests designed to demonstrate and evaluate the performance of several commercially available data base management system (DBMS) products compatible with the Digital Equipment Corporation VAX 11/780 computer system are summarized. The tests were performed on the INGRES, ORACLE, and SEED DBMS products employing applications that were similar to scientific applications under development by NASA. The objectives of this testing included determining the strength and weaknesses of the candidate systems, performance trade-offs of various design alternatives and the impact of some installation and environmental (computer related) influences. M.G.

N85-17742# Naval Postgraduate School, Monterey, Calif.
TOWARDS AN IDEAL DATABASE SERVER FOR OFFICE AUTOMATION ENVIRONMENTS
S. A. Demurjian, D. K. Hsiao, D. S. Kerr, and P. R. Strawser Oct. 1984 28 p
(RR0-1403)
(AD-A148184; NPS52-84-018) Avail: NTIS HC A03/MF A01 CSCL 09/2

Office automation systems are growing, both in use and in complexity. The development of a database mangement system for the office automation environment becomes a high priority, in order to provide an efficient and reliable way to manage the information needs of the office. Therefore, the specification of an ideal database sever for the office automation environment becomes a key area of concern. In addition to providing traditional support, the ideal database server must also provide new database support, in order to meet the unique and many needs of office automation environments. In this paper, we focus on the characterization and specification of an ideal database server for the office automation environment. We also consider how such an ideal database server can be effectively integrated into the office automation environment. Further, we examine an experimental database system, known as the multi-backened database system (MBDS), as a candidate for the ideal database server in the office automation environment. Author (GRA)

N85-17743# Naval Postgraduate School, Monterey, Calif.
PERFORMANCE EVALUATION OF A DATABASE SYSTEM IN MULTIPLE BACKEND CONFIGURATIONS
S. A. Demurjian, D. K. Hsiao, D. S. Kerr, J. Menon, and P. R.

Strawser Oct. 1984 29 p
(RR0-1408)
(AD-A148192; NPS52-84-019) Avail: NTIS HC A03/MF A01 CSCL 09/2

The aim of this performance evaluation is twofold: (1) to devise benchmarking strategies for and apply bencmarking methodologies to the measurement of a prototyped database system in multiple backend configurations, and (2) to verify the performance claims as projected or predicted by the designer and implementor of the multi-backend database system known as MBDS. Despite the limitation of the backend hardware, the benchmarking experiments have proceeded well, producing startling results and good insights. By collecting macroscopic data such as the response time of the request, the external performance measurements of MBDS have been conducted. By collecting microscopic data such as the time entering and leaving a system process, the internal performance measurements of MBDS have been carried out. Methodologies for constructing test databases, directories, and requests have been devised and utilized. The performance evaluation studies verify that (1) when the database remains the same the response time of a request can be reduced to nearly half, if the number of backends and their disks is doubled; (2) when the response set of a request doubles, the response time of the query remains nearly constant, if the number of backends and their disks is doubled. These were the performance claims of MBDS as predicted by its designer and implementor. Author (GRA)

N85-17744# SRI International Corp., Menlo Park, Calif. Network Information Center.
DDN DIRECTORY
Mary K. Stahl, ed., Glenn Sherwood, ed., Nancy Fischer, ed., and Susan Romano, ed. Jun. 1984 692 p
(Contract DCA200-83-C-0025)
(AD-A148213) Avail: NTIS HC A99/MF A01 CSCL 05/2

An introductory section outlines services and documents available from the DDN Network Information Center, information about user registration, TAC access, DDN policies and procedures and contact names. The directory gives names, online and geographic mail addresses, and telephones of authorized users. Other useful sections include Host names and addresses for Host administrators and Host Technical Liaisons; host accronyms and host configurations. Author (GRA)

N85-17745# Vermont Univ., Burlington.
EUROPEAN SCIENTIFIC NOTES. VOLUME 38, NUMBER 11
Larry E. Shaffer, ed. Nov. 1984 39 p
(AD-A148228; ESN-38-11) Avail: NTIS HC A03/MF A01 CSCL 05/2

European Scientific Notes (ESN) is a monthly publication with brief articles on recent developments in European scientific research. The publication is not intended to be part of the scientific literature. The value of ESN articles to Americans is to call attention to current developments in European science and technology and to the institutions and people responsible for these efforts. ESN authors are primarily ONRL staff members. Occasionally articles are prepared by or in cooperation with staff members of the USAF European Office of Aerospace Research and Development or the US Army Research and Standardization Group. Qualified US scientists travelling in Europe may also be invited to author an ESN article. Author (GRA)

N85-17746# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
THE COMBINATORICS OF LOCAL CONSTRAINTS IN MODEL-BASED RECOGNITION AND LOCALIZATION
W. Eric L. Grimson Apr. 1984 40 p
(Contracts N00014-80-C-0505; N00014-82-K-0334)
(AD-A148338; AI-M-763) Avail: NTIS HC A03/MF A01 CSCL 09/4

The problem of recognizing what objects are where in the workspace of a robot can be cast as one of searching for a consistent matching between sensory data elements and equivalent model elements. In principle, this search space is enormous and to contain the potential combinatorial explosion, constraints between the data and model elements are needed. We derive a set of constraints for sparse sensory data that are applicable to a wide variety of sensors and examine their completeness and exhaustiveness. We then derive general theoretical bounds on the number of interpretations expected to be consistent with the data under the effects of local constraints. These bonds are applicable to many types of local constraints, other than the specific examples used here. For the case of sparse, noisy three-dimensional sensory data, explicit values for the bounds are computed and are shown to be consistent with empirical results obtained earlier in (Grimson and Lozano-Perez 1984). The results are used to demonstrate the graceful degradation of the recognition technique with the presence of noise in the data, and to predict the number of data points needed in general to uniquely determine the object being sensed. GRA

N85-17747# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
BORING INFORMATION AND SUBSURFACE DATA BASE PACKAGE USER'S GUIDE Final Report
W. E. Strohm, Jr. and J. B. Palmerton Sep. 1984 174 p
(AD-A148623; WES/IR/GL-84-1) Avail: NTIS HC A08/MF A01 CSCL 09/2

A data base package for storage, retrieval, and display of boring and subsurface data for geotechnical projects is described, and detailed instructions for using the package are given with examples for actual projects. The data package is designed for storage, rapid retrieval, and display of boring locations, boring logs and profiles, and contours of selected subsurface data. The package provides for easy, interactive data entry and editing with automatic data checks and error messages when data exceeds user-specified ranges. Data storage and retrieval are accomplished using the Corps of Engineers (CE) purchased copy of SYSTEM 2000 Data Base Management System (trademark of Intel Systems Corp) on the Corps-wide time-sharing service operated (1984) by Control Data Corp (CDC). The data entry and retrieval programs developed for the package are designed for a low skill level and minimum training of personnel. Data entry can also be accomplished on CE District Harris computers. GRA

N85-17748# Naval Research Lab., Washington, D. C.
A DESCRIPTION OF THE NRL OBLIQUE-INCIDENCE-IONOGRAM DATA BASE
J. M. Goodman 11 Dec. 1984 27 p
(AD-A148625; NRL-MR-5452) Avail: NTIS HC A03/MF A01 CSCL 05/2

Since 1980 the Naval Research Lab. has been engaged in a number of field experiments during which sequences of oblique-incidence ionograms have been obtained. Data has been accumulated in both analog-photographic and digital form with the majority of the earlier data sets being of the former category. Approximately 50,000 ionograms have been archived for analysis purposes. This report outlines the texture of the data base indicating the mix of properties which may be employed to partition the data. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N85-17749# Institute for Defense Analyses, Alexandria, Va. Cost Analysis Group.
ON ESTIMATING THE COST GROWTH OF WEAPON SYSTEMS Final Report, 1 Nov. 1979 - 30 Sep. 1984
N. J. Asher and T. F. Maggelet Sep. 1984 87 p
(AD-A147297; AD-E500683; IDA-P-1494-REV; IDA/HQ-84-29211) Avail: NTIS HC A05/MF A01 CSCL 15/3

This paper documents schedule and cost growth in major DOD weapon system acquisition programs that have attained Initial Operational Capability (IOC). Utilizing Selected Acquisition Report data, a methodology for projecting probable future growth

in evolving systems that have not yet reached IOC was developed and described. Use of the growth projection methodology as an adjunct to future IDA weapon system analyses is recommended.
GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N85-17750# Office of Technology Assessment, Washington, D.C.
INTERNATIONAL COOPERATION AND COMPETITION IN CIVILIAN SPACE ACTIVITES Summary Report
Jul. 1984 35 p
(OTA-ISC-240) Avail: NTIS HC A03/MF A01

The state of international competition in civilian space activities is assessed, U.S. civilian objectives in space are explored, and alternative options are suggested for enhancing the overall U.S. position in space technologies and space science. Past, present, and projected international cooperative arrangements for space activities are investigated and their relationship to competition in space is examined. The relationship between space policy and foreign policy is examined with respect to the extent that they affect international civilian activities in space. Two major problems which dominate the organization and implementation of U.S. civilian policies towards space are identified: there is no national consensus about long term goals and activities, and the political and economic dimension of space activities now exceed the purview of any one government agency. A.R.H.

N85-17751# Comision Nacional de Investigacion del Espacio, Madrid.
[SPACE RESEARCH IN SPAIN]
1984 83 p refs Presented at 25th COSPAR Plenary Meeting, Graz, 25 Jun.-7 Jul. 1984 Original contains color illustrations
Avail: NTIS HC A05/MF A01

Spain's space program and the Madrid space center are described. The program includes meteorology and neutral atmosphere, ionosphere, astrophysics, cosmic radiation, remote sensing, Spacelab, and sounding rocket projects. Author (ESA)

N85-17752# Royal Society, London (England).
UNITED KINGDOM REPORT ON SPACE RESEARCH Annual Report, 1982-1983
1984 97 p refs Presented at 25th COSPAR Plenary Meeting, Graz, 25 Jun.-7 Jul. 1984 Sponsored by British National Committee on Space Research
Avail: NTIS HC A05/MF A01

British involvement in ESA and NASA programs and other space research is summarized. Satellite projects include EXOSAT, IRAS, ISEE, GEOS-2, AMPTE, and Solar Maximum Mission. Neutral atmosphere research is expanded to include sea surface temperature determination from ERS-1 (ESA satellite). A satellite laser ranger was installed. Author (ESA)

N85-17753# Danish Academy of Technical Sciences, Copenhagen.
SPACE RESEARCH IN DENMARK Annual Report, 1982-1983
1984 24 p refs Presented at 25th COSPAR Plenary Meeting, Graz, 25 Jun.-7 Jul. 1984 Sponsored by Danish government
Avail: NTIS HC A02/MF A01

Danish participation in ESA programs is outlined. Research in space and plasma physics, astrophysics, meteorology (balloon, rocket, satellite), geodesy, astrometry, and crystal growth in microgravity is described. Author (ESA)

N85-17754# Helsinki Univ. of Technology, Espoo (Finland).
SPACE ACTIVITIES IN FINLAND Annual Report, 1982-1983
S. Urpo, ed. 1984 13 p refs Presented at 25th COSPAR Plenary Meeting, Graz, 25 Jun.-7 Jul. 1984
Avail: NTIS HC A02/MF A01

The Finnish space applications program, space research, satellite tracking, telemetry and acquisition facilities, and cooperation in international projects are summarized. Projects include remote sensing of Earth resources and environment, satellite meteorology, satellite communication networks, satellite navigation, ionospheric and magnetospheric research, satellite geodesy, and satellite-borne astronomy. Author (ESA)

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N85-17192# Joint Publications Research Service, Arlington, Va.
BBC OF SWITZERLAND DEVELOPS ELECTRIC CAR
In its West Europe Rept.: Sci. and Technol. (JPRS-WST-85-001) 2 Jan. 1985 p 4-5 Transl. into ENGLISH from Frankfurter Zeitung/Blick Durch die Wirtsch. (Frankfurt/Main), 2 Nov. 1984 p 7 (For primary document see N85-17190 08-31)
Avail: NTIS HC A05/MF A01

88 SPACE SCIENCES (GENERAL)

N85-17755*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE ORIGIN OF NONRADIATIVE HEATING/MOMENTUM IN HOT STARS
A. B. Underhill, ed. and A. G. Michalitsianos, ed. Washington Jan. 1985 262 p refs Workshop held in Greenbelt, Md., 5-7 Jun. 1984 Sponsored in part by American Astronomical Society (NASA-CP-2358; Rept-85B0136; NAS 1.55:2358) Avail: NTIS HC A12/MF A01 CSCL 03B

The origin of nonradiative heating and momentum in the atmospheres of stars is studied. The similarities and differences between what occurs in the hot stars and what occurs in cool stars are emphasized. Key points in the theory are reviewed. Areas requiring new study are indicated. For individual titles, see N85-17756 through N85-17789.

N85-17756*# Wisconsin Univ., Madison.
EVIDENCE FOR NON-RADIATIVE ACTIVITY IN HOT STARS c89
J. P. Cassinelli *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 2-23 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03A

Indications of non-radiative activity in hot stars were investigated. Data used as evidence of non-radiative activity includes: (1) evidence for high temperature regions, especially regions that are too hot to be explained by shocks that can be initiated and driven by radiative forces; (2) evidence for multi-plume flow. Non-spherically symmetric flow can be diagnosed by the effect it can have on the polarization of the light from a star; and (3) direct evidence for stellar magnetic fields. Author

N85-17757*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
EVIDENCE FOR NON-RADIATIVE ACTIVITY IN STARS WITH T SUB eff > 10000 K c89
Jeffrey L. Linsky *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 24-46 refs (For primary document see N85-17755 08-88)
(Grants NAG5-82; NGL-06-003-057)
Avail: NTIS HC A12/MF A01 CSCL 03A

Major advances in the acquisition of evidence for and the understanding of nonradiative heating and other activity in stars cooler than T sub eff = 10,000 K has occurred in the last few years primarily as a result of the IUE and Einstein spacecraft. This evidence is critically reviewed and trends that are now becoming apparent are noted. The existence for nonradiatively heated outer atmospheric layers (chromospheres, transition regions, and coronae) in dwarf stars cooler than spectral type A7, in F ang G giants, pre-main sequence stars, and close binary systems in unambiguous, and chromospheres exist in the K and M giants and supergiants. The existence of nonradiative heating in the outer layers of the A stars remains undetermined despite repeated searches at all wavelengths. Some important trends in these data are the decrease in plasma emission measure with age on the main sequence and decreasing rotational velocity. Variability and atmospheric inhomogeneity is commonly seen, and there is considerable evidence that magnetic fields define the geometry and control the energy balance in the outer atmospheric layers. B.W.

N85-17758*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
OBSERVATIONS OF NONTHERMAL RADIO EMISSION FROM EARLY-TYPE STARS **c89**
D. C. Abbott, J. H. Bieging (California Univ., Berkely), and E. Churchwell (Wisconson Univ., Madison) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 47-52 refs (For primary document see N85-17755 08-88)
(Grants NSF AST-82-18375; NSF AST-79-05578; NSF AST-81-14717)
Avail: NTIS HC A12/MF A01 CSCL 03A

As a part of a wider survey of radio emission from O, B, and Wolf-Rayet (WR) stars, five new stars whose radio emission is dominated by a nonthermal mechanism of unknown origin were discovered. From statistics of distance-limited samples of stars, it is estimated that the minimum fraction of stars which are nonthermal emitters is 25% for the OB stars and 10% for the WR stars. The characteristics of this new class of nonthermal radio emitter are investigated. B.W.

N85-17759*# Lick Observatory, Santa Cruz, Calif.
NONRADIAL PULSATION AND MASS LOSS IN EARLY B STARS **c89**
G. Donald Penrod and Myron Smith (National Solar Observatory) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 53-56 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03A

It has been firmly established that nonradial pulsation (NRP) probably occurs in nearly all sharp-lined early B stars near the main sequence. A recent breakthrough occurred with the discovery of quasi emission/absorption bumps moving across the line profiles of the rapid rotators zeta Oph and alpha Vir. It was found that an intermediate-1 (1=8) NRP mode is responsible for these features in zeta Oph. Some 20 Be and Bn stars were monitored and convincing evidence for NRP in 13 of them was found. Line profile variations suggestive of NRP in the other 7 were also discovered. A search for line profile variables among moderate rotators has turned up NRP in epsilon and eta Lep, with v sin i's of 140 and 70 km/sec, respectively. It now seems that NRP can be present at all rotational velocities with equal frequency (near 100%!). However, at most 20% of these stars exhibit detectable photometric variations. B.W.

N85-17760*# Computer Sciences Corp., Falls Church, Va.
NARROW ABSORPTION COMPONENTS IN Be STAR WINDS **c90**
C. A. Grady *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 57-61 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03C

The stars omega Ori (B2 IIIe), 66 Oph (B2 IVe), and 59 Cyg (B1.5 IVe) are discussed. The extent to which the narrow absorption components in these Be stars differs from narrow components in the O stars and gamma Cas is explored. Any models or mechanisms for the formation of narrow absorption features in the UV resonance lines of Be star spectra must account for the presence of multiple narrow absorption features which are variable in number, radial velocity, and strength. Models predicting a high and low density structure to the stellar wind caused by instabilities in a flow driven by radiation pressure or by variable mass loss may be more successful in describing the behavior of winds in early Be stars. These models appear to be capable of producing single absorption components in the velocity range observed for O stars and very early Be stars. R.S.F.

N85-17761*# Waterloo Univ. (Ontario). Dept. of Physics.
LIGHT VARIATIONS OF THE B-TYPE STAR HD 160202 **c89**
Gustav A. Bakos *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 62-65 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03A

Light variations of the B-type star HD 160202 in the galactic cluster M6 are presented. A flare type increase in brightness by about three magnitudes in a time interval of 40 minutes was recorded. It is shown that a B-type star in the galactic cluster M 6 went through the process of shell formation and a flare type increase in brightness in a time interval of three years. Similar cases associated with B-type stars were reported in the past; however, they represent sporadic and accidental observations. The observations presented here show a flare-type event with a resolution of five minutes. R.S.F.

N85-17762*# Space Telescope Science Inst., Baltimore, Md.
ULTRAVIOLET SPECTRAL MORPHOLOGY OF O-TYPE STELLAR WINDS **c90**
Nolan R. Walborn *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 66-69 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03C

The highly systematic behavior of the stellar wind features among the majority of O-type spectra, and their strong correlations with the well-calibrated optical spectral types, are consistent with those wind models which incorporate a structural dependence on the fundamental stellar parameters. On the contrary, wind models which postulate a predominance of random rotational or magnetic effects, unrelated to the fundamental stellar parameters, are not supported by the ultraviolet spectral morphology; rather, such effects may contribute to the observed properties of some of the exceptionally peculiar objects. R.S.F.

N85-17763*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
NONTHERMAL RADIO EMISSION AND THE HR DIAGRAM **c93**
D. M. Gibson (New Mexico Inst. of Mining and Technology) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 70-74 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

Perhaps the most reliable indicator of non-radiative heating/momentum in a stellar atmosphere is the presence of nonthermal radio emission. To date, 77 normal stellar objects have been detected and identified as nonthermal sources. These stellar objects are tabulated herein. It is apparent that non-thermal radio emission is not ubiquitous across the HR diagram. This is clearly the case for the single stars; it is not as clear for the binaries unless the radio emission is associated with their late-type components. Choosing to make this association, the single stars and the late-type components are plotted together. The following picture emerges: (1) there are four locations on the HR diagram where non-thermal radio stars are found; (2) the peak incoherent 5 GHz luminosities show a suprisingly small range for stars within each class; (3) the fraction of stellar energy that escapes as radio emission can be estimated by comparing the integrated maximum radio luminosity to the bolometric luminosity; (4) there are no apparent differences in L sub R between binaries with two cool

components, binaries with one hot and one cool component, and single stars for classes C and D; and (5) The late-type stars (classes B, C, and D) are located in parts of the HR diagram where there is reason to suspect that the surfaces of the stars are being braked with respect to their interiors. R.S.F.

N85-17764*# Pennsylvania State Univ., University Park. Dept. of Astronomy.
X-RAY ACTIVITY IN PRE-MAIN SEQUENCE STARS **c93**
Eric D. Feigelson *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 75-80 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03C

X-ray findings and their interpretation with respect to winds and surface activity of pre-main sequence stars are summarized. Some recent optical and radio observations supporting the X-ray evidence for giant flares on PMS stars are discussed. The unusual properties of PMS/T Tauri stars were for many years primarily attributed to their strong winds. Numerous lines of evidence are outlined herein indicating that PMS stars also have enhanced surface activity, including extremely strong individual flares. R.S.F.

N85-17765*# Observatoire de Paris-Meudon (France).
ACTIVE PHENOMENA IN THE PRE-MAIN SEQUENCE STAR AB AUR **c92**
F. Praderie, T. Simon (Hawaii Univ.), A. M. Boesgaard (Hawaii Univ.), P. Felenbok, C. Catala, J. Czarny, and A. Talavera (ESA. ESA Tracking Station, Madrid) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 81-85 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

The Herbig Ae star AB Aur presents short time scale variability in the Mg II and Ca II resonance lines. A qualitative model of the expanding envelope, involving fast and slow streams in a co-rotating structure, is proposed to explain the Mg II spectral variability. Author

N85-17766*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CORONAL TEMPERATURES **c89**
J. H. Swank *In its* The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 86-90 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03A

The solid state spectrometer (SSS) on the Einstein Observatory (HEAO 2) was sensitive in the energy range 0.5 to 4.5 keV to fluxes as low as 4x10 to the 12th power ergs/cu cm/s. Good spectra were obtained for 19 stars, including Algol, 7 RS CVn systems, 2 dMe stars, 2 W UMa binaries, 1 GV single star, and 3 0B supergiants, 2 BV stars and 1 07 binary. This is a very incomplete survey of stellar coronae, but it does include coverage of several late and early types and usually more than 1 sample of the class. The results for these stars suggest two generalizations despite the small numbers: (1) there is a broad variety of X-ray spectra of stellar coronae; and (2) there probably are X-ray spectral types (X-ray coronae of stars of similar other properties have similar temperatures). Evidence indicating that some emission distributions are bimodal is discussed. Finally, some remarks are made concerning the spectra of the early type stars and constraints on the presence of very high temperatures. M.G.

N85-17767*# Universidad Nacional Autonoma de Mexico, Mexico City. Inst. de Astronomia.
BIPOLAR EJECTION OF MATTER FROM HOT STARS **c90**
Paris Pismis *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 91-100 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

A general program on the internal velocities in H II regions was carried out within the past decade by the use of photographic Fabry-Perot interferometry, in the H (alpha) line and lately also in the [N II]lambda 6584 line. Among the score of objects studied three H II regions and one planetary nebula possess pronounced symmetry around their ionizing stars. Velocity data combined with morphological properties suggest strongly that the nebulae were formed essentially by matter ejected from the central star and that ejection occurred preferentially from diametrially opposite regions on the star, that is, in a bi-polar fashion. The nebulae are discussed individually and a model for the ejection mechanism is presented. M.G.

N85-17768*# Applied Research Corp., Landover, Md.
STELLAR WINDA: OBSERVATIONAL EVIDENCE FOR A HOT-COOL STAR CONNECTION **c90**
Wayne L. Waldron *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 95-100 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01

Stellar wind data was collected for a total of 272 stars representing all spectral types including Wolf-Rayet stars. Two significant correlations are found relating the wind luminosity (L sub w = 1/2 MV sub infinity squared) to the bolometric luminosity and the terminal velocity of the stellar wind to the stellar effective temperature. Least-squared fits to the data suggest that the wind luminosity is approximately the bolometric luminosity squared and the terminal velocity is approximately the effective temperature to the 1.8 power. The surprising result is that all spectral types throughout the HR diagram are represented in these correlations. M.G.

N85-17769*# Florence Univ. (Italy). Inst. de Astronomia.
HEATING IN THE SOLAR MANTLE **c92**
Claudio Chiuderi *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 101-105 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

In the case of the solar chromosphere and corona (the solar mantle) the primary energy source is the mechanical energy from photospheric motions. Plenty of energy is available; the problem is to transfer the needed amount of energy to the proper place to account for the observations. The global problem is reviewed from the point of view of the generation and transmission of energy, the intermediate storage of energy, and the release of energy in such a way that the observed features are generated. M.G.

N85-17770*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
THEORY TESTED BY MEANS OF THE STARS **c89**
L. Golub *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 106-120 refs (For primary document see N85-17755 08-88) (Grant NAGw-112)
Avail: NTIS HC A12/MF A01 CSCL 03B

The viability of the solar alpha-omega dynamo model was studied through examination of extreme stellar cases expected to show specific types of deviation from solar behavior. Observational data was taken from studies of main sequence stars with shallow convective zones, fully convective M-dwarfs, and a Pleiades X-ray survey. M.G.

N85-17771*# Heidelberg Univ. (West Germany). Inst. fuer Theoretische Astrophysik.
THE SCALING OF CORONAL MODELS FROM ONE STAR TO ANOTHER **c90**
R. Hammer *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 121-124 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

The requirements that must be met in order that stationary numerical corona models can be scaled from one star to another are discussed. A corona model is a solution of the conservation equations for mass, momentum, and energy, subject to appropriate boundary conditions, and of the equation of state. In general, the mass M and radius R of the star enter these equations and boundary conditions as free parameters. A given solution can be

scaled to other stars only if all equations can be rewritten in such a form that M and R do no longer appear explicitly as free parameters, but only implicitly as scaling factors of the variables. An adequate means to find these scaling factors is a homologous transformation: one multiplies all variables and parameters by separate constants (i.e., scaling factors) and requires that the equations and boundary conditions remain valid. This leads to a set of nonlinear relations between the transformation constants. Only if in this set the two constants associated with M and R can be chosen independently, can a given numerical corona model be scaled to arbitrary stars. M.G.

N85-17772*# Heidelberg Univ. (West Germany). Inst. fuer Theoretische Astrophysik.
OVERHEATED OPEN CORONAL REGIONS c92
R. Hammer *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 125-129 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

The physics of compact, hydrostatic coronal shells formed from the collapse of overheated coronae is addressed. A large number of hydrostatic shells was computed for the usual exponential heating law with constant damping length. The boundary conditions were that on both sides of a shell the conductive flux at chromospheric temperatures is small. The boundary value problem was solved with a shooting technique. The main goal of the calculations was to determine the dependence of the shells on coronal heating flux (F sub Mo) and damping length (L); and in particular, to localize the boundary line in the parameter space (F sub Mo, L) that separates normal extended coronae from coronal shells. M.G.

N85-17773*# Delaware Univ., Newark.
COROTATING INTERACTION REGIONS IN STELLAR WINDS: PARTICLE ACCELERATION AND NON-THERMAL RADIO EMISSION IN HOT STARS c90
D. J. Mullan *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 130-135 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01

A co-rotating interaction region (CIR) forms in a stellar wind when a fast stream from a rotating star overtakes a slow stream. The CIR's were studied in detail in the solar wind over the past decade primarily because they are efficient sources of particle acceleration. Here, CIR's in OB star winds are used to explain two properties of such winds: deposition of non-radiative energy in the wind far from the stellar surfaces and acceleration of non-thermal particles. Author

N85-17774*# Space Telescope Science Inst., Baltimore, Md.
SYNCHROTRON EMISSION FROM CHAOTIC STELLAR WINDS c90
Richard L. White *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 136-140 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

A model is presented for the radio emission from hot stars. Electrons are accelerated to relativistic energies by shocks in the wind near the star and emit radio radiation through the synchrotron mechanism. The particle spectrum and radio spectrum for this model are derived. The model accounts for many of the observed characteristics of some recently discovered stars which have peculiar radio emission. Author

N85-17775*# National Center for Atmospheric Research, Boulder, Colo. High Altitude Observatory.
WINDS FROM ROTATING, MAGNETIC, HOT STARS c90
David B. Friend *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 142-147 refs Sponsored by NSF (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

The effect of a magnetic field coupled with stellar rotation on the wind from a hot star, which is driven primarily by line radiation pressure, is discussed. B.G.

N85-17776*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DEPARTURES FROM LTE POPULATIONS VERSUS ANOMALOUS ABUNDANCES: THE EFFECTS OF HEATING c90
Anne B. Underhill *In its* The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 148-158 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

The deposit of nonradiative heat and momentum in the mantle of a hot star affects the interpretation of the stellar spectrum in two ways. First, a superheated and moving plasma should be considered when doing the analysis, and second, a model atom which is appropriate for the physical state of the line forming regions. Some examples are presented for H and He showing how the changes in the electron temperature affect the solution of the equations of statistical equilibrium. The observed spectra of the Wolf-Raynet stars HD 191765, HD 192103, and HD 192163 are compatible with a normal H/He abundance ratio. Author

N85-17777*# Applied Research Corp., Landover, Md.
IS THE RATIO OF OBSERVED X-RAY LUMINOSITY TO BOLOMETRIC LUMINOSITY IN EARLY-TYPE STARS REALLY A CONSTANT? c90
Wayne L. Waldron *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 159-163 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

The observed X-ray emission from early-type stars can be explained by the recombination stellar wind model (or base coronal model). The model predicts that the true X-ray luminosity from the base coronal zone can be 10 to 1000 times greater than the observed X-ray luminosity. From the models, scaling laws were found for the true and observed X-ray luminosities. These scaling laws predict that the ratio of the observed X-ray luminosity to the bolometric luminosity is functionally dependent on several stellar parameters. When applied to several other O and B stars, it is found that the values of the predicted ratio agree very well with the observed values. Author

N85-17778*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NON-RADIATIVE ENERGY FROM DIFFERENTIAL ROTATION IN HOT STARS c90
Kwing L. Chan (Applied Research Corp., Landover, Md.), H. G. Mayr, and I. Harris *In its* The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 164-168 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

A model of differential rotation is proposed for the upper radiative envelopes of hot stars, and it is suggested that the actions of such motions can be the source of energy for heating the coronae. Author

N85-17779*# Tokyo Astronomical Observatory (Japan).
BIPOLAR FLOWS AND X-RAY EMISSION FROM YOUNG STELLAR OBJECT c93
Yutaka Uchida and Kazunari Shibata (Aichi Univ. of Education, Japan) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 169-176 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

Production of both the large scale CO bipolar flows and the small scale optical bipolar jets from the star-forming regions is given interpretation in terms of a magnetic mechanism related to accretion model. It is shown by an axisymmetric 2.5-dimensional simulation that the large scale cold bipolar flow may be produced in the relaxation of the magnetic twist which is created by the rotational winding-up of the magnetic field in the contracting disk. In contrast, the small scale warm bipolar jets may be driven by

the recoiling shocks which are produced in the crash at the stellar surface of the infalling material released from the inner edge of the disk through magnetic reconnections. Author

N85-17780*# Calgary Univ. (Alberta). Dept. of Physics.
NONRADIATIVE HEATING AND ENHANCED MASS-LOSS DUE TO SHEAR TURBULENCE IN MASSIVE HOT STARS c90
S. R. Sreenivasan and W. J. F. Wilson *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/ Momentum in Hot Stars Jan. 1985 p 177-182 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

Rotation in massive stars generates shear turbulence. This has the consequence of heating the outer layers of massive stars and enhancing mass-loss in the early spectral types. Model calculations are presented and discussed in support of these effects. Author

N85-17781*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A LEAKY WAVEGUIDE MODEL FOR MHD WAVE DRIVEN WINDS FROM CORONAL HOLES c90
Joseph M. Davila *In its* The Origin of Nonradiative Heating/ Momentum in Hot Stars Jan. 1985 p 183-187 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

Magnetohydrodynamic (MHD) waves, driven by the large scale convective motions of the photosphere are suggested as a possible source of additional acceleration for the stellar wind. Most of the turbulent power in a coronal hole is carried by MHD waves with periods of a few hundred seconds or longer. This is evident from direct observations of turbulence in the solar photosphere, as well as in situ observations of turbulence in the solar wind. But waves with periods this long have wavelengths which are typically as large as the transverse scale of the coronal hole flux tube itself. For these waves boundary effects are important and the coronal hole must be treated as a waveguide. The propagation of MHD waves using this waveguide approach is discussed. The simple model presented demonstrates that coronal holes can act as waveguides for MHD waves. For typical solar parameters the waves are compressible and can generate a wave tensile force which tends to cancel at least part of the wave pressure force. This effect tends to decrease the efficiency of MHD wave acceleration. R.J.F.

N85-17782*# Sterrewacht Sonnenborgh, Utrecht (Netherlands).
RADIATIVELY DRIVEN WINDS AND WHAT THEY IMPLY: A REVIEW OF RADIATIVE DRIVEN INSTABILITIES AND THEIR IMPORTANCE IN HOT STARS c90
A. G. Hearn *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 188-198 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

The mass loss and acceleration of the mass flow comes, directly or indirectly, from the radiative forces of the resonance lines. These radiative forces can also cause instabilities to grow in the flow, and this is probably an important source of non-radiative heating and momentum in hot stars. The physical origin of these instabilities is described, and some of the problems of hot stars where radiative driven instabilities may play a part are briefly discussed. R.J.F.

N85-17783*# Tokyo Astronomical Observatory (Japan).
MAGNETIC EFFECTS IN THE HEATING AND MODIFICATION OF FLOWS IN THE OUTER STELLAR ATMOSPHERES WITH APPLICATION TO EARLY TYPE STAR CASE c90
Yutaka Uchida *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 199-220 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

Possible magnetic effects in the heating and modification of flows in early type star atmospheres are discussed by referring to the physically related phenomena dealt with for late type stars, young stars, and close binary systems. It is pointed out as the result of that the magnetic field may play important roles also in early type star atmospheres in converting the energy of the radiatively driven outflow into heat, or in modifying the outflow by nozzling or by initial modification of temperature and/or momentum by which the effect of the radiation pressure may be made the most of in accelerating the outflow. Author

N85-17784*# California Univ., San Diego, La Jolla.
EFFECT OF SCATTERING ON INSTABILITIES IN LINE-DRIVEN STELLAR WINDS c90
S. P. Owocki and G. B. Rybicki (Harvard Center for Astrophysics, Cambridge, Mass.) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 221-225 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

Line driven O-B stellar winds are unstable to perturbations of short spatial wavelength and the growth rates for such instabilities are very rapid. The nature of the nonlinear development of this instability is unknown, but might possibly be one of blobs of gas driven through ambient gas or a quasiregular train of outward moving shocks. In either case the resulting dissipation of mechanical energy might explain the observed anomalous heating n O-B stars as evidenced by their X-ray emission and high ionization state. It also might explain the observed fine structure of the absorption lines and their time variability. The driving due to the absorption of the stellar continuum flux was considered and the effects of the diffuse, scattered radiation field were neglected. It was shown that under certain special conditions the effect of scattering could reduce the instability growth rate to zero. A stability analysis that includes scattering, but that uses the more physically realistic assumption of complete redistribution instead of coherent scattering, and that includes the effects of transverse velocity gradients, which become important as the flow moves away from the stellar surface is presented. It is found that the instability is eliminated right at the base of the wind, but that as the flow moves outward the instability rate rapidly becomes equal to a substantial fraction of the calculated value, the fraction asymptotically reaching 80% at large radii. Since this still implies many e folds in a characteristic outflow time, the primary conclusion that these winds are highly unstable is unchanged. E.A.K.

N85-17785*# Astronomical Inst., Utrecht (Netherlands).
NEW INSTABILITIES IN LINE DRIVEN WINDS c90
P. C. H. Martens *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 226-232 (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

The physical mechanisms which potentially lead to instabilities in line driven winds, the drift instability and the line shape instability, are discussed. A general three dimensional treatment of the stability problem of line driven winds which leads to the general dispersion equation is proposed. From this dispersion equation automatically a third physical mechanism driving instability in stellar winds is deduced; the thermal drift instability which is related to changes in absorption of radiation caused by temperature perturbations. This mechanism results in growing inwardly propagating sound waves. E.A.K.

N85-17786*# Heidelberg Univ. (West Germany).
RADIATIVE AMPLIFICATION OF ACOUSTIC WAVES IN HOT STARS c90
B. E. Wolf *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 233-235 (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

The discovery of broad P Cygni profiles in early type stars and the detection of X-rays emitted from the envelopes of these stars made it clear, that a considerable amount of mechanical energy has to be present in massive stars. An attack on the problem, which has proven successful when applied to late type stars is proposed. It is possible that acoustic waves form out of random fluctuations, amplify by absorbing momentum from stellar

radiation field, steepen into shock waves and dissipate. A stellar atmosphere was constructed, and sinusoidal small amplitude perturbations of specified Mach number and period at the inner boundary was introduced. The partial differential equations of hydrodynamics and the equations of radiation transfer for grey matter were solved numerically. The equation of motion was augmented by a term which describes the absorption of momentum from the radiation field in the continuum and in lines, including the Doppler effect and allows for the treatment of a large number of lines in the radiative acceleration term. E.A.K.

N85-17787*# Observatoire de Paris-Meudon (France). Dept. Recherches Spatiales.
ON THE ROLE PLAYED BY LINES IN RADIATIVELY DRIVEN STELLAR WINDS DEPENDING ON THE POSITION OF THE STARS IN THE HR DIAGRAM c90
Marie Christine Migozzi and Jean-Pierre J. Lafon *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/ Momentum in Hot Stars Jan. 1985 p 236-240 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

The radiative force due to transfer in ultraviolet lines is always an important mechanism in hot star wind dynamics. However, it is not clear when it is the dominant mechanism and which are the noise parameters. To investigate the efficiency of purely radiative momentum/energy transfer in hot star winds and in various regions of the HR diagram, the Leroy and Lafon model was improved and put to its limits; correlations between the mass loss rate, the luminosity and other parameters and the theoretical and the observational results, looking for observed stars violating the model were compared. It is concluded that in widespread region of the HR diagram, line driven models are consistent with observations, the radiative equilibrium physics is relevant throughout the expanding atmospheres and the mass loss rate is quasilinearly correlated with the luminosity. E.A.K.

N85-17788*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
MULTILINE TRANSFER AND THE DYNAMICS OF STELLAR WINDS Abstract Only c90
David C. Abbott and L. B. Lucy (Columbia Univ., New York) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 241 Submitted for publication (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

A Monte Carlo technique for treating multiline transfer in stellar winds is described. With a line list containing many thousands of transitions and with fairly realistic treatments of ionization, excitation and line formation, the resulting code allows the dynamic effects of overlapping lines the investigation of and provides the means to directly synthesize the complete spectrum of a star and its wind. It is found that the computed mass loss rate for data Puppis agrees with the observed rate. The synthesized spectrum of zeta Puppis also agrees with observational data. This confirms that line driving is the dominant acceleration mechanism in this star's wind. E.A.K.

N85-17789*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SUMMARY OF THE ORIGIN OF NONRADIATIVE HEATING/ MOMENTUM IN HOT STARS c90
Anne B. Underhill *In its* The Origin of Nonradiative Heating/ Momentum in Hot Stars Jan. 1985 p 243-254 (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

Nonradiative heating in the atmospheres of stars and the deposit of nonradiative momentum in the stellar atmosphere were examined. Observations made from space have been very important in changing the concept of what a star is like. In order to interpret the spectroscopic information gained in the wavelength region inaccessible from the surface of the Earth, chiefly in the domain of X-rays and of ultraviolet radiation. The assumptions which underlie the theory of stellar atmospheres will have to be reused. Improved observation facilities are major reasons to consider new ideas for interpreting the spectra of stars. The photometric precision and sensitivity for observing at high and at moderate spectral resolutions have increased greatly. The development of high dispersion, high resolution spectrographs for observing is noted. E.A.K.

N85-17790# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
X-RAY AND UV EMISSION FROM ACTIVE GALACTIC NUCLEI
Wolfgang Brinkmann, ed. and Joachim Truemper, ed. Oct. 1984 293 p refs Conf. held in Garching, West Germany, 9-13 Jul. 1984
(MPE-184; ISSN-0340-8922) Avail: NTIS HC A13/MF A01

Radio, optical, and UV observations of active galactic nuclei (AGN); X-ray observations; the physics of AGN; AGN models; AGN evolution; and the ROSAT mission were discussed. For individual titles, see N85-17791 through N85-17847.

N85-17791# European Southern Observatory, Garching (West Germany).
OPTICAL AND UV EMISSION OF ACTIVE GALACTIC NUCLEI c93
M. H. Ulrich *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 1-10 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The study of the optical and ultraviolet properties of active galactic nuclei (quasars, BL Lac objects, Seyfert and radio galaxies) is reviewed. The 3000A hump, violently variable quasars, optical polarization, the physics of dense gas clouds, and the intercloud medium are discussed. Author (ESA)

N85-17792*# California Univ., San Diego, La Jolla. Center for Astrophysics and Space Sciences.
BL LACERTAE OBJECTS: MULTIFREQUENCY OBSERVATIONS AND MODEL APPLICATIONS c89
Diane M. Worrall *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 11-13 refs (For primary document see N85-17790 08-88)
(Grant NAG5-63)
Avail: NTIS HC A13/MF A01 CSCL 03A

Quasi-simultaneous spectra covering radio, IR, optical and UV wave bands of BL Lac and active galactic nuclei were obtained. The X-ray flux densities from other epochs, and information on temporal behavior in the various wave bands, are used in model fitting. The required amount of relativistic beaming in these sources is calculated as <30. Author (ESA)

N85-17793# Nuffield Radio Astronomy Labs., Jodrell Bank (England).
RADIO SEYFERTS AND THE FORBIDDEN LINE REGION c93
A. Pedlar and J. E. Dyson *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 14-17 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

A model in which the expansion of the radio emitting components in Seyfert 2 nuclei compress and accelerate the ambient medium by means of shock waves is described. When the expansion velocity of the component decreases to $<$ 400 km/sec, the compressed gas cools and radiates producing the forbidden line region. This readily accounts for the intimate relationship between the radio continuum emission and the properties of the forbidden line region. Author (ESA)

N85-17794# Mullard Radio Astronomy Observatory, Cambridge (England).
THE RELATIONSHIP BETWEEN RADIO STRUCTURES AND STELLAR DYNAMICS OF NEARBY ELLIPTICAL GALAXIES c90
M. Birkinshaw and R. L. Davies (Kitt Peak National Observatory, Tucson) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 18-20

refs Sponsored by UK Science and Engineering Research Council and Gonville and Caius College (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The radio and rotation axes of nearby elliptical galaxies were compared. Results suggest that the radio axes generally lie close to the rotation axes, and that the galaxies hosting radio sources are not dynamically unusual. Author (ESA)

N85-17795# Tel-Aviv Univ. (Israel). Wise Observatory.
ACTIVE INNER REGIONS OF ISOLATED GALAXIES c90
N. Brosch *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 21-24 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Very isolated galaxies were observed in spectral regions from 5 GHz to 2500 THz. Nuclear UV excesses are found to be a general phenomenon. This is interpreted as indicating that in isolated galaxies the inner regions are more active in forming stars than in nonisolated galaxies. The occurrence of star formation deeper in the gravitational well may be the reflection of a real difference in mass distribution between isolated and nonisolated objects. Author (ESA)

N85-17796# Padua Univ. (Italy). Inst. di Astronomia.
A NEW ESTIMATE OF THE LOCAL LUMINOSITY FUNCTION OF SEYFERT 1 NUCLEI c89
F. Z. Cheng (Center for Astrophysics, Hefei, China), L. Danese, G. DeZotti, and A. Franceschini *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 25-27 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The nuclear magnitudes of all confirmed Seyfert 1 and 1.5 galaxies in the area covered by the first 9 Markarian lists were estimated using the color given method. A comparison with independent estimates obtained by subtracting from the observed flux the expected contribution of an appropriate template galaxy and with the nuclear magnitudes derived for 11 Seyfert 1's on the basis of detailed multicolor surface photometry, suggests that the rms errors are 0.4 mag in the U band and 0.5 mag in the B band. Author (ESA)

N85-17797# Technische Univ., Berlin (West Germany). Inst. fuer Astronomie und Astrophysik.
OPTICAL STUDIES OF X-RAY SELECTED ACTIVE GALACTIC NUCLEI (AGN) IN THE DIRECTION OF THE LARGE MAGELLANIC CLOUD (LMC) c89
Manfred W. Pakull *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 28-31 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Optical follow-up studies of 19 X-ray point sources detected with the Einstein HRI detector revealed that 17 are not associated with our neighboring galaxy being either galactic foreground stars or background interlopers. It is found that 80% of this sample are coronal-type stellar X-ray emitters, some of them optically faint Me stars with high Lx/Lv ratios. Including one less accurately positioned IPC source, only four objects are identified with active galactic nuclei showing broad Balmer and narrow forbidden emission. Their X-ray and optical luminosity classify them as Seyfert 1 galaxies at low redshift ($z<0.2$). Two AGN at $z = 0.063$ and 0.075 are optically resolved on deep Schmidt plates, and 1 exhibits the combination of strong FeII emission and low OIII/H Beta line ratio. Their potential role for the study of the LMC interstellar medium is pointed out. Author (ESA)

N85-17798# Ruhr Univ., Bochum (West Germany). Inst. fuer Astronomische.
CONTINUOUS TRANSITION FROM STAR BURST GALAXIES TO SEYFERT GALAXIES c90
Gerhard F. O. Schnur (Centro Hispano-Aleman), Th. Schmidt-Kaler, and J. V. Feitzinger *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 32-34 refs Sponsored by Deutsche Forschungsgemeinschaft (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The relation between Seyfert galaxies (SG) and star burst galaxies (SBG) was investigated. A high resolution spectral survey indicates that there is no clear distinction between SBG and SG. There seems to be a smooth transition from SBG activity to SG activity, as detected in the increased velocity space and increased intensity of the emission lines while the transition goes from SBG to SG. Author (ESA)

N85-17799# Institut d'Astrophysique, Paris (France).
THE ULTRAVIOLET SPECTRA OF THE NARROW LINE ACTIVE GALAXIES NGC 3081 AND NGC 4507 c89
F. Durret and J. Bergeron *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 35-39 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The continuum and emission line spectra of two narrow line galaxies observed by IUE are discussed. The UV power law index is given and the reddening correction is discussed. The nominal power law index between the UV and X-ray range is derived. Optical and UV line intensities are provided. Author (ESA)

N85-17800# Observatoire de Paris-Meudon (France).
PRELIMINARY RESULTS ON THE ULTRAVIOLET OBSERVATIONS OF A COMPLETE X-RAY SELECTED SAMPLE OF ACTIVE GALACTIC NUCLEI (AGN) c93
C. Boisson *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 40-42 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

An X-ray selected sample drawn from observations of the HEAO A-2 sky survey was analyzed statistically. It is complete above a well defined threshold, has a high identification content (97%) and as it was observed in the hard X-ray range, is not affected by photoelectric absorption. Preliminary UV results on BL Lac, Seyfert 1.9 and Seyfert 1 galaxies subsamples are reported. Author (ESA)

N85-17801# Institut d'Astrophysique, Paris (France).
LOW EXCITATION ABSORPTIONS IN THE SPECTRUM OF THE QUASAR PKS 1327-206 DUE TO THE GALAXY MCG 03-34-085 c93
D. Kunth and J. Bergeron *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 43-46 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

A strong NaI D absorption line in the spectrum of quasar PKS 1327-206 ($z_e = 1.1696$) at a red shift $z_a = 0.0180$, very similar to that of the galaxy MCG 03-34-085 which lies 38 arcsec away in the plane of the sky was discovered. Combined optical and UV observations confirm that the gas far from the nucleus of MCG 03-34-085 is of low ionization degree, with unusual large column densities for such a galactocentric distance. This is to be compared with the higher ionization degrees and smaller equivalent widths found in high Galactic latitude gas. This evidence supports the hypothesis that the lines originate in the outer disk at a large distance from the nucleus. The existence of such an extended disk is further supported by the weak diffuse continuum emission in CCD frames near the quasar. Author (ESA)

N85-17802*# Washington Univ., Seattle. Dept. of Astronomy.
THE EXTRAGALACTIC NATURE OF H0323+022 c93
Bruce Margon and George H. Jacoby (Kitt Peak National Observatory, Tucson) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 47-50 refs (For primary document see N85-17790 08-88)
(Grants NAG8-433; NSF ATS-78-09228)
Avail: NTIS HC A13/MF A01 CSCL 03A

Imaging and spectroscopic observations probed the nature of the X-ray source H0323+022. It is suggested that H0323+022 is extragalactic, and similar to a variety of other X-ray selected BL Lac objects. The extended image, when combined with estimates of the linear size of an underlying galaxy, implies both visible and X-ray luminosities consistent with this hypothesis. In a stellar interpretation, the angular extension would require attributing yet another unique feature to the object. The interpretation of the stellar absorption spectrum as misidentification of the object at the telescope is supported. Two candidates for that unrelated stellar object, which are also the next closest bright visible objects to the X-ray source are proposed. It is predicted that the late type absorption spectrum will never again be seen in H0323+022.
Author (ESA)

N85-17803# Max-Planck-Inst. fuer Astronomie, Heidelberg (West Germany).
MORPHOLOGY AND OPTICAL POLARIZATION OF THE 3C 273 JET **c93**
K. Meisenheimer and H.-J. Roeser *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 51-54 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The optical polarization, morphology, and color of the 3C 273 radio jet were studied to see if it could be included in one of the three common types of jet. The jet of 3C 273 consists of at least three distinct regions which totally differ in their optical emission properties: the inner part (plateau), the highly polarized optical knot and the strong radio hot spot, which was not detected optically. Thus the 3C 273 jet cannot be classified as a simple type 1, 2 or 3 jet. Author (ESA)

N85-17804# Ruhr Univ., Bochum (West Germany). Inst. fuer Astronomische.
SPATIALLY RESOLVED OPTICAL SPECTROSCOPY OF THE RADIO JET OF THE X-RAY GALAXY NGC 2110 **c93**
Gerhard F. O. Schnur (Centro Astronomico Hispano-Aleman), J. V. Feitzinger, and Th. Schmidt-Kaler *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 55-57 refs Sponsored by Deutsche Forschungsgemeinschaft (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The spectrum of NGC 2110 was obtained with extremely high spectral and spatial resolution in a study of Seyfert galaxy nuclei. A shell expanding with a velocity of 250 km/sec is observed at the end of the jet. The main components, which have line widths of 270 km/sec, are composed of at least 2 lines, that differ little in radial velocity. There are also fainter components with larger relative velocities. The velocity structure at the nuclear position is much more complex and defies any reasonable fitting. The nuclear structure of NGC 2110 differs significantly from that of 3C305, which shows a similar optical and radio structure. No broad line width (FWZJ 3600 km/sec for H alpha) is reported. However, individual line features are observed over a few arcsec extension and spread over a large velocity range. Author (ESA)

N85-17805# Bonn Univ. (West Germany). Inst. fuer Astrophysik.
EXTRAGALACTIC COSMIC RAYS FROM ACTIVE GALAXIES **c93**
Maurice M. Shapiro and Rein Silberberg (Hulbert Center for Space Research) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 58-60 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The extragalactic cosmic rays (ECR) within our Supercluster are discussed. It is suggested that from observations of Galactic cosmic rays (GCR), a plausible spectrum and energy density for the ECR is deduced. The two most powerful active galactic nuclei in our Supercluster can provide virtually all of the energy required for the inferred flux and spectrum. Considerations of internal consistency support the foregoing hypotheses. These ideas can be tested by high-energy neutrino astronomy. Author (ESA)

N85-17806# Byurakan Observatory (USSR).
A COMPARISON OF SOME PHOTOMETRIC PARAMETERS OF ACTIVE AND NORMAL SPIRAL GALAXIES **c89**
A. T. Kalloghlian *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 61-62 (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Photometric and colorimetric parameters of several Markarian and normal galaxies were compared. By the mean weighted surface brightnesses the 9 Markarian galaxies are 0.7 mag brighter than 7 normals while the mean surface brightnesses of both samples calculated the usual way are practically the same. For both samples a large dispersion is observed in (U-B, B-V) diagrams constructed for measured points in each galaxy. About 30% of integral intensity of galaxies in both samples is due to the areas located above the black body line in the (U-B, B-V) diagrams. The scatter in colors is much larger for the Markarian galaxies.
Author (ESA)

N85-17807# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
X-RAY SURVEYS OF QUASARS WITH THE EINSTEIN OBSERVATORY **c89**
Tommaso Maccacaro *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 63-72 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The contribution of the HEAO 2 satellite (Einstein Observatory) to the understanding of quasars is summarized. Einstein Observatory data confirm that quasars are, as a class, powerful X-ray emitters and are major contributors to the diffuse X-ray background. A large number of quasars was discovered by the Observatory during the optical identification process of serendipitous X-ray sources detected with the Imaging Proportional Counter and High Resolution Imager. Before the launch of the Einstein Observatory, quasars were basically radio and optically selected quasi-stellar objects, very luminous and at fairly high red shifts. X-ray selection favors the detection of low red shift, low luminosity objects, so that many of the X-ray selected objects come from the boundary region between classical quasars and Seyfert galaxies. In this respect the Observatory contributed to further crumbling the distinction between quasars and Seyfert galaxies and to promoting use of the term active galactic nuclei to refer to these objects in general. Author (ESA)

N85-17808*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
X-RAY EMISSION FROM ACTIVE GALACTIC NUCLEI **c93**
Richard Mushotzky *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 73-87 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01 CSCL 03A

The advantages of X-ray astronomy for studying active galactic nuclei (AGN) are discussed. If the X-ray emission from AGN arises from a region close to the central energy source X-ray observations may provide the best constraints on the central engine. The shape of the X-ray continuum gives information about the mechanism for photon generation; X-ray time variability data can constrain the size and mass of the continuum source; and X-ray occultation data gives constraints on the relative sizes of the continuum source and the intervening absorbing material. Since a fair fraction of the total energy of an AGN is emitted at X-ray wavelengths, direct measurement of the amount and spectral form of this radiation is important for modeling of the optically emitting clouds. Author (ESA)

N85-17809# Mullard Space Science Lab., Dorking (England).
EXOSAT OBSERVATIONS OF ACTIVE GALACTIC NUCLEI **c89**

G. Branduardi-Raymont, S. J. Bell-Burnell (Royal Observatory, Edinburgh), B. Kellett, H. Fink (Max-Planck Inst. fuer Physik und Astrophysik, Garching, West Germany), D. Molteni (Palermo Univ., Italy), and I. McHardy (Leicester Univ., England) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 88-91 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Observations by EXOSAT of the Type 1 Seyfert galaxies NGC3783 and NGC5548 are reported. The X-ray spectrum of NGC3783 is not heavily cutoff at low energies, unlike the results of previous observations. This suggests that the conditions of the broad-line region in NGC3783 are different from those in which the earlier data were obtained. A low-energy excess in the spectrum of NGC5548 suggests that this is due to the presence of a break in the continuum distribution between the soft X-ray and UV ranges. Author (ESA)

N85-17810# Consiglio Nazionale delle Ricerche, Milan (Italy). Ist. di Fisica Cosmica e Tecnologie Relative.
SOFT X-RAY EMISSION FROM BL LAC OBJECTS **c93**
D. Maccagni, L. Chiappetti (ESA, Darmstadt, West Germany), B. Garilli, P. Giommi (ESA, Darmstadt, West Germany), D. Molteni, M. Morini, and A. Rampini *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 92-95 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Observations by EXOSAT LE telescope of BL Lac objects are discussed. Results from two observations of PKS 0548-322, a strong source, and the limits of an observation of a weak source, AP Librae, are considered. The peculiar image obtained of BL Lac itself is mentioned. Author (ESA)

N85-17811# Institute of Space and Astronautical Science, Tokyo (Japan).
CHARACTERISTICS OF X-RAY SPECTRA FROM GALACTIC AND EXTRAGALACTIC X-RAY SOURCES **c89**
Masaru Matsuoka *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 96-98 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The X-ray spectra obtained with TENMA satellite are used to study the relation between active galactic nuclei and Galactic X-ray sources. Most X-ray pulsars produce strong iron emission lines with energy of 6.4 keV, while a few X-ray pulsars do not emit appreciable flux of iron lines. Low mass X-ray binaries, Sco X-1, Cyg X-2 and 4U1608-52 produce narrow 6.7 keV iron emission lines. Active galactic nuclei, NGC4151 and Cen A, produce strong 6.4 keV iron emission lines, while no appreciable iron emission lines are detected in the spectra of BL Lac objects PKS2155-304 and Mkn 421. Author (ESA)

N85-17812# Nagoya Univ. (Japan). Dept. of Astrophysics.
X-RAY EMISSION FROM PKS 2155-304 **c93**
Hideyo Kunieda *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 99-101 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Satellite TENMA observed the X-ray emission from the active galactic nuclei of the BL Lac object PKS 2155-304. The net X-ray intensity from 2 to 6 keV was obtained in each orbit. The light curve on 1 and 3 October is shown. The average intensity from 2 to 10 keV in each day is 8.6 and 8.8 times 10 to the minus 11th power erg/sec sqcm, comparable to the intensity in 1978 by HEAO-1 but 3 times larger than in 1979 by HEAO-2. An intensity variation by a factor of 2 in 4hr is seen on 1 October. Each energy spectrum can be simulated by a power law spectrum with a fixed value of NH = 2 times 10 to the 20th power H/sqcm. The photon indices and the intensities on 1 and 3 October are not appreciably different from one another. The deconvolved spectrum of whole data is shown. Author (ESA)

N85-17813# Los Alamos Scientific Lab., N. Mex.
X-RAY EMISSION FROM CENTAURUS A **c93**
James Terrell *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 102-104 refs Sponsored by US Department of Energy (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The X-ray strength of Cen A (NGC 5128) was monitored for 10 yr by Vela 5B, beginning in 1969. The 1973-1975 period of exceptional activity and strength was especially well covered. It is characterized by numerous rapid changes in intensity, in agreement with other data, indicating that the nucleus of Cen A is small but massive. Author (ESA)

N85-17814# Pennsylvania State Univ., University Park. Dept. of Astronomy.
X-RAY SPECTRA OF ACCRETION DISKS **c89**
P. Meszaros and W. Nagel (Max-Planck Institut fuer Physik und Astrophysik, Garching, West Germany) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 221-223 refs (For primary document see N85-17790 08-88)
(Grant NSF AST-83-13886)
Avail: NTIS HC A13/MF A01

Nonthermal, semithermal, and thermal models of active galactic nuclei radiation spectra are discussed. Results of calculations of the X-ray spectrum from thin and thick accretion disks around massive black holes are presented. Author (ESA)

N85-17815# Institute of Space and Astronautical Science, Tokyo (Japan).
THE X-RAY SPECTRA OF NGC 4151 **c89**
M. Matsuoka and T. Ikegami *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 108-110 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The TENMA satellite observed NGC4151 with gas scintillation proportional counters in January and March 1984. During these two intervals the X-ray intensity is as weak as a few microJy, showing variability on a time scale of a few days. Spectra from NGC4151 reveal a strong iron emission line with an energy of 6.4 keV; i.e., the equivalent width for both periods is 300 to 350 eV. This suggests that the line intensity is too intense to be emitted through a simple fluorescence mechanism due to the observed continuum X-rays above the energy of the K-edge.
Author (ESA)

N85-17816# Technische Univ., Berlin (West Germany). Inst. fuer Astronomie und Astrophysik.
EXO 1102.8+2539, AN X-RAY VARIABLE ACTIVE GALACTIC NUCLEUS (AGN) **c89**
K. Beuermann, L. Stella (ESOC, Darmstadt, West Germany), and W. Sieber (Max-Planck Inst. fuer Radioastronomie) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 111-113 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

A serendipitous variable X-ray source was discovered using the LE experiment of the EXOSAT satellite. It is identified with a starlike object of 18m and 1950 coordinates alpha = 11h 02m 47s, delta = +25deg 23 min 2. An IDS spectrum obtained with the ESO 3.6m telescope shows H alpha and H beta redshifted with z = 0.095. The FWHM of the lines is 700 km/sec. No forbidden-line emission is seen above the noise level. An observation with the 100m Effelsberg radio telescope failed to detect the source above a 3 sigma limit of 6 mJy at 4.9 GHz. The object seems to be radio quiet and to belong to a class of red weak-line active galactic nuclei. Author (ESA)

N85-17817# Naval Research Lab., Washington, D. C.
ONE TO EIGHT MONTH X-RAY LIGHT CURVES FOR ACTIVE EXTRAGALACTIC OBJECTS **c89**

W. A. Snyder and K. S. Wood *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 114-117 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Light curves of 4 extragalactic objects obtained using the 0.5 to 20 keV LASS detectors on HEAO 1 are presented. Two of the objects are quasi-stellar sources; one is a BL Lacertae object; the fourth, although not unambiguously identified, is certainly extragalactic. In each case the light curves have a temporal resolution of a few days, and (because the sources are located at high ecliptic latitudes) extend at least 30 days in length. Variability is definitely detected in 3 of the 4 objects, suggesting that significant changes in flux may be common in active galaxies on monthly time scales. Author (ESA)

N85-17818# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
THE HIGH ENERGY X-RAY SPECTRUM OF 3C 273 c89
M. Bezler (Tuebingen Univ., West Germany), R. Staubert (Tuebingen Univ., West Germany), E. Kendziorra (Tuebingen Univ., West Germany), G. Hasinger, W. Pietsch, C. Reppin, J. Truemper, and W. Voges *In its* X-ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 118-120 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The balloon telescope High Energy X-ray Experiment was used to search for a break in the spectrum of 3C 273, because as a nearby quasar it is a strong source of X-rays and the HEAO-1 spacecraft observed a rather hard spectrum. Results show that the absolute intensity is higher (factor 1.5 in 18 to 30 keV) than expected. The spectrum is very flat (index -1.20 + or -0.17). There is no high energy break up to at least 200 keV. Under the assumption of a thermal model, there is an obvious correlation between the intensity and the electron temperature. Compared to HEAO-A4 data luminosity increases by a factor of 3. The absolute luminosity in the 20 to 200 keV range is 1.2 times 10 to the 47th power erg/sec. Author (ESA)

N85-17819# Arizona Univ., Tucson. Steward Observatory.
UV AND X-RAY OBSERVATIONS OF AGN: TWO COMPARISONS WITH OTHER WAVE LENGTHS c89
Matthew A. Malkan *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 121-128 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Combination of UV and X-ray observations of Active Galactic Nuclei (AGN) with measurements at lower frequencies for statistical studies is discussed. Two color-magnitude diagrams for AGN are shown. The optical continuum band, centered at a rest wavelength of 4220A, is compared to the ultraviolet continuum fluxes at 1460 and 1770A. The correlation between the infrared and X-ray continua is presented. Author (ESA)

N85-17820# California Univ., San Diego. Center for Astrophysics and Space Sciences.
THE HEAO-1 DIFFUSE COMPONENT SPECTRUM FROM 15 TO ABOVE 500 keV c93
D. E. Gruber, R. E. Rothschild, J. L. Matteson, and R. L. Kinzer (NRL) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 129-134 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The spectrum of the diffuse X and gamma-ray background was measured over a band of > 2 decades with scintillator detectors aboard the HEAO-1 satellite. The apertures of the detectors were modulated on time scales of hours and the difference in counting rates measured the diffuse component flux. The observed spectrum is presented and compared with other measurements. The possible contribution to the diffuse component above 100 keV from active galaxies is discussed. Author (ESA)

N85-17821*# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany).
THE X-RAY PROPERTIES OF HIGH-REDSHIFT, OPTICALLY SELECTED QSOS c89
Scott F. Anderson and Bruce Margon *In its* X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 132-134 refs (For primary document see N85-17790 08-88)
(Grant NAG8-433)
Avail: NTIS HC A13/MF A01

The X-ray properties of high redshift quasars were probed using grism/grens plates covering 13 sq deg of sky imaged to very sensitive X-ray flux levels with the Imaging Proportional Counter on the Einstein Observatory. Optical magnitudes are estimated from image diameter measurements to obtain an X-ray flux detection, or a sensitive X-ray flux upper limit, from the IPC image. Eleven out of 52 optically selected quasars are detected in X-rays at > 3 sigma. The alpha ox value is 1.49 + or - 0.04 for the 52 objects. Author (ESA)

N85-17822# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
ON THE SURFACE DENSITY OF X-RAY SELECTED BL LACERTAE OBJECTS c89
Isabella M. Gioia, T. Maccacaro, D. Maccagni (CNR, Milan), and J. Stocke (Arizona Univ., Tucson) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 135-137 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Eight BL Lac objects from HEAO 1 and 2 were studied. The X-ray number flux relation of the objects is derived. The implications of the results with respect to their luminosity function, cosmological evolution and X-ray to optical flux ratio are discussed. Author (ESA)

N85-17823# Cambridge Univ. (England). Inst. of Astronomy.
COMMENTS ON THE PHYSICS OF ACTIVE GALACTIC NUCLEI c90
Martin J. Rees *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 138-151 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Physical processes relevant to the central parsec of active galactic nuclei (AGNs) are discussed. Radio and X-ray jets, broad line emitting region, gas clouds, plasma flow, electron-positron pair production, the primary power source, and AGN statistics are considered. Author (ESA)

N85-17824# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany).
PHYSICAL PROCESSES IN RELATIVISTIC PLASMAS c89
Roland Svensson *In its* X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 152-163 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The processes taking place in relativistic plasmas and the standard models for the continuum emission from active galactic nuclei are discussed. The effects pair production have on these models and the observational implications of the presence of electron-positron pairs are considered. Electron-positron pair production in nonthermal models of the continuum emission where optical depth to photon-photon pair production is >1 is reviewed. Author (ESA)

N85-17825# Milan Univ. (Italy). Dept. di Fisica.
ON THE BROADBAND ENERGY SPECTRA OF QUASARS AND BL LAC OBJECTS c90
L. Maraschi *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 164-176 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Continuum observation of active galactic nuclei from radio to X-ray frequencies is summarized, yielding an average broadband

energy distribution for the two main classes of active galactic nuclei, quasars and BL Lac objects. Within quasars radio loud and radio quiet objects are distinguished. Overall similarities and differences which appear are used to discuss emission mechanisms in the various bands. An attempt is made to relate the mechanisms to a unified scheme. In the optical UV band the average spectra of quasars are much flatter than those of BL Lacs. Highly polarized quasars, which are also optically violently variable resemble BL Lac objects in the shape of the optical continuum. In the infrared, radio loud and radio quiet quasars and BL Lac objects do not differ substantially. The hypothesis that the flat optical-UV component of quasars is due to an accretion disk explains the spectral shape and low polarization of the emission in this band. Author (ESA)

N85-17826*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A UNIVERSAL SPECTRUM FOR AGNs AND QSOs c93
Demosthenes Kazanas *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 177-180 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01 CSCL 03A

The effects of the feedback of e+-e- pair reinjection in a plasma due to photon photon absorption of its own radiation is examined. Under the assumption of continuous electron injection with a power law spectrum and Compton losses only, it is shown that for power law index <2 the steady state electron distribution function has a unique form independent of the primary injection spectrum. This electron distribution function can by then reproduce the general characteristics of AGN, QSO spectra from radio to X-rays. It also implies gamma ray emission from these objects consistent with the observations of the diffuse gamma ray background. Author (ESA)

N85-17827# Rome Univ. (Italy). Ist. Astronomico.
AN INVERSE COMPTON MODEL OF THE X-RAY EMISSION IN SEYFERT GALAXIES c93
G. C. Perola and L. Piro *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 181-184 refs Sponsored by CNR and Italian Ministry of Education (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Inverse Compton (IC) scattering of low energy photons by relativistic electrons is studied as a mechanism for the X-ray emission in Seyfert galaxies. The radiative properties of IC models applied to NGC 4151 are discussed. According to spectral and variability data, several components appear to make up the NGC 4151 spectrum from the radio to the ultraviolet. If the X-rays are the products of the first order IC scattering between relativistic electrons and photons supplied by these components, the one providing by far the largest photon energy density (hence the dominant contribution to the process) is the variable optical-ultraviolet component. This is characterized by a shortest time scale = 10 days and an estimated L(1-100 eV) = 4.6 times 10 to the 43rd power erg/sec. Author (ESA)

N85-17828*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. Lab. for High Energy Astrophysics.
SHOCK ACCELERATION IN ACTIVE GALACTIC NUCLEI AND QUASARS c90
Demosthenes Kazanas and Donald C. Ellison (Maryland Univ., College Park) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 185-187 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01 CSCL 03A

A model of spherical accretion on a massive black hole as the energy source for active galactic nuclei and quasars is considered. According to the model, the kinetic energy of the infalling material is randomized by a collisionless shock around the black hole. Relativistic protons are produced with high efficiency via first order Fermi shock acceleration and, because their kinetic energy is much larger than the gravitational potential energy, do not fall into the black hole. The model can produce relativistic particles with flat spectra needed to account for the radiation from these sources, including their broad band spectral characteristics. Since all electrons are secondaries resulting from proton-proton collisions throughout the volume of the source, this model avoids the Compton catastrophe problem. Author (ESA)

N85-17829*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
POWER LAW X- AND GAMMA-RAY EMISSION FROM RELATIVISTIC THERMAL PLASMAS c93
Andrzej A. Zdziarski *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 188-192 refs (For primary document see N85-17790 08-88)
(Grant NAGW-246)
Avail: NTIS HC A13/MF A01 CSCL 03A

Pair equilibrium in thermal plasmas emitting power law photon spectra by repeated Compton scatterings of a soft photon source active galactic nuclei was studied. Dependence of the spectral index on optical thickness and on temperature of the plasma is discussed. The equation for pair equilibrium is solved for the maximum steady luminosity. Analytical solutions for the subrelativistic region, and for the ultrarelativistic region are found. In the transrelativistic region the solutions are expressed by single integrals over the pair production cross sections, performed numerically. The constraints on soft photon source imposed by the condition that the soft photon flux cannot exceed the black-body flux are considered. For the Comptonized synchrotron radiation model a relation between magnetic field strength and output luminosity is found. Author (ESA)

N85-17830# Cambridge Univ. (England). Inst. of Astronomy.
PAIR PRODUCTION AT MODERATE OPTICAL DEPTHS c93
Susan Stepney and P. W. Guilbert (Max-Planck Institut fuer Extraterrestrische Physik, Garching, West Germany) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 193-196 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Electron-positron pair production effects on the hard X-ray spectra of active galactic nuclei and gamma ray bursters were studied. Thermal plasmas with temperatures = mcsq and optical depths from 1 to 5, including pair processes, Comptonization and bremsstrahlung were investigated. Analytic and numerical results for equilibrium and impulsively heated plasmas are presented. Author (ESA)

N85-17831# Padua Univ. (Italy). Ist. di Astronomia.
ON THE HYDRODYNAMICAL EQUATIONS OF ASTROPHYSICAL JETS c90
M. Calvani, L. Nobili, and R. Turolla (International School for Advanced Studies) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 197-199 ref (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Models to explain the formation and collimation of beams of gas in active galactic nuclei are discussed. A model with a black hole as prime mover is outlined. The fact that the overall luminosity of radiation supported tori can be largely super-Eddington and that it is emitted mostly within the two narrow funnels which characterize these configurations, provides a plausible way to accelerate matter up to relativistic velocities. The funnels are filled with fully ionized plasma, continuously lost from the disk surface through a mechanism analogous to the stellar wind. As a consequence of the competing action of the gravitational and radiative forces a stagnation point exists in the funnel. Depending on the strength of the radiative forces, gas is accelerated outwards, or, where gravity prevails, the flow is directed inwards and ultimately swallowed by the hole. Author (ESA)

N85-17832# Turin Univ. (Italy). Ist. di Fisica Generale.
COLLIMATED WINDS FROM ACTIVE GALACTIC NUCLEI c90
A. Ferrari, R. Rosner (Harvard-Smithsonian Center for Astrophysics), E. Trussoni, and K. Tsinganos (Harvard-Smithsonian Center for Astrophysics) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 200-202 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

A mechanism of astronomical jet-acceleration via radiation pressure momentum addition and the hydrodynamic approach in the twin-exhaust model are proposed. Expansion of the gas at the exit of the accretion funnel may synergistically interact with the funnel's intense radiation field to act as a nozzle against the gravitational field of the central object. The model shows that wind theory can be suitably scaled to explain the presence of supersonic flows from the inner core of radio galaxies; in contrast to jets emerging from quasars, it is not clear if jets emerging from the center of radio galaxies are relativistic in their inner part. Propagation of jets out of the potential well of the parent galaxy may lead to peculiar and observable features related to the physical conditions in the jet itself and in the central engine. Author (ESA)

N85-17833# Oxford Univ. (England). Dept. of Astrophysics.
AN ALTERNATIVE TO RELATIVISTIC BEAMING IN AGN c90
C. S. Coleman *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 203-205 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

A mechanism for creating and maintaining strong anisotropy in the phase space distribution of radiating particles in active galactic nuclei (AGN) is proposed. The resulting particle distribution is shown to provide natural explanations for the high brightness temperatures, superluminal velocities and spectral features of various classes of AGN, without recourse to relativistic beaming.
Author (ESA)

N85-17834# Catania Univ. (Italy). Ist. di Astronomia.
MODELS OF NONKEPLERIAN ACCRETION DISKS BASED ON DYNAMO MAGNETIC FIELD: APPLICATION TO ACTIVE GALACTIC NUCLEI (AGN) c90
G. Belvedere, D. Molteni (Palermo Univ., Italy), and R. M. Pidatella (Kiepenheuer Inst.) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 206-210 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

A model of a nonkeplerian accretion disk in which the stress tensor is expressed in terms of the large scale components of a dynamo magnetic field and in which X-ray emission is due to magnetic energy dissipation through a coronal mechanism is presented. It is shown that the Maxwell stress in the equation of state is relevant in comparison to radiation and gas pressures, suggesting a basic role of the magnetic field in determining structure, dynamics, and energetics of accretion disks. The analytical solutions depend on the mass of the compact object, the accretion rate, the geometric dimensions, and the angular momentum per unit mass at the outer disk boundary.
Author (ESA)

N85-17835# Zurich Univ. (Switzerland). Inst. fuer Theoretische Physik.
CENTRIFUGALLY DRIVEN MAGNETOHYDRODYNAMIC (MHD) WINDS AND THE NONTHERMAL EMISSION REGIONS IN ACTIVE GALACTIC NUCLEI (AGN) c90
M. Camenzind and T. J.-L. Courvoisier (European Southern Observatory, Munich) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 212-214 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

A model for the nonthermal energy of broad line active galactic nuclei, in which the rotational energy released by the central source is carried away by a strong MHD wind is outlined. At a certain distance from the central object, this wind is terminated by a strong (fast) magnetosonic shock which dissipates its energy in the spectral branches. When the central object is a supermassive magnetized and rapidly rotating object, the centrifugal instability can drive a strong MHD wind away from the equatorial region. Since the light cylinder for rapidly rotating supermassive objects is very close to the surface of the object, the discussion of wind flows from such objects has to be based on relativistic MHD. Author (ESA)

N85-17836# European Southern Observatory, Garching (West Germany). Space Telescope European Coordinating Facility.
MACROSCOPIC CURRENTS AND WIND PERTURBATIONS IN THE FRAME OF THE WIND AND SHOCK MODEL c90
T. J.-L. Courvoisier and M. Camenzind (Zurich Univ.) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 215-217 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The formation of macroscopic currents in the shock layer of active galactic nuclei is analyzed. The results can be used to study the stability of the whole structure and to define a preferred direction in the formation of jets. Modifications caused by a perturbation in the wind to the IR-optical and X-ray regions of the emission spectrum are estimated. Author (ESA)

N85-17837# Leicester Univ. (England). Dept. of Astronomy.
DUELLING WINDS: A MODEL FOR BROAD-LINE REGIONS c90
Michael D. Smith and Derek J. Raine *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 218-220 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

A model for broad-line regions in which the X-ray flux from a galactic nucleus Compton-heats an accretion disk, releasing a large amount of hot gas as a wind is discussed. This material becomes entrained into a wind blowing from the nucleus. Provided the ram pressure of the nuclear wind exceeds that of the disk wind, it collapses into clouds. The nuclear wind accelerates small clouds to higher velocities, corresponding to observed line widths. Large clouds fall inwards. Cloud sizes, line asymmetries and variability characteristics are determined. While large clouds can be responsible for a blueward shift of a peak of a line, the fast-moving small clouds can enhance the red wing. Author (ESA)

N85-17838# Pennsylvania State Univ., University Park. Dept. of Astronomy.
X-RAY SPECTRA OF ACCRETION DISKS c89
P. Meszaros and W. Nagel (Max-Planck Institut fuer Physik und Astrophysik, Garching, West Germany) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 221-223 refs (For primary document see N85-17790 08-88)
(Grant NSF AST-83-13886)
Avail: NTIS HC A13/MF A01

Nonthermal, semithermal, and thermal models of active galactic nuclei radiation spectra are discussed. Results of calculations of the X-ray spectrum from thin and thick accretion disks around massive black holes are presented. Author (ESA)

N85-17839# Manchester Univ. (England). Dept. of Astronomy.
THEORETICAL STUDIES OF EMISSION LINE VARIABILITY IN TYPE 1 SEYFERT GALAXIES c89
A. Robinson *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 224-228 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The emission line variability observed in type 1 Seyfert galaxies is investigated using a time dependent photoionization model of the broad line emitting gas. A set of models was calculated for various time dependence functions and different broad line region geometries. The emission line light curves and profiles for one model are shown. Author (ESA)

N85-17840# Kentucky Univ., Lexington. Dept. of Physics and Astronomy.
ON THE STABILITY OF BROAD LINE CLOUDS IN ACTIVE GALACTIC NUCLEI **c90**
Moshe Elitzur and Gary Ferland *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 229-231 refs (For primary document see N85-17790 08-88)
(Grants NSF AST-83-04895; NSF AST-83-05094)
Avail: NTIS HC A13/MF A01

The radiation pressure caused by the trapped line photons in clouds producing the broad line emission around active galactic nuclei is analyzed and found to be important for the stability of the clouds. It may provide a natural explanation for the great uniformity in values of density and ionization parameter found in quasars and Seyfert galaxies. Author (ESA)

N85-17841# Cambridge Univ. (England). Inst. of Astronomy.
THE ORIGIN OF THE X-RAY BACKGROUND **c93**
A. C. Fabian *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 232-242 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Data on the 0 to 50 keV X-ray background are reviewed. The spectrum of the X-ray background fits a thermal bremsstrahlung model remarkably well. This raises the possibility that most of the background is diffuse and originates in a hot intergalactic plasma. Contributions by point sources need not exceed 20% above 3 keV. Below 1 keV, the X-ray background is dominated by a galactic contribution due in part to a combination of hot gas and stars. The spectrum in the range 1 to 3 keV is uncertain. A galactic contribution amounting to a few percent is also observed in the 2 to 10 keV range, possibly due to inverse Compton scattering of starlight by low energy cosmic-ray electrons. The remaining background is highly isotropic, with any fluctuations remaining after accounting for observed classes of sources being $< 2\%$ on scales of 25 sq deg. An additional component becomes apparent in the spectrum above 100 keV, leading to the MeV bump, possibly due to active galactic nuclei. Author (ESA)

N85-17842# European Southern Observatory, Garching (West Germany).
ACTIVE GALACTIC NUCLEI AND THEIR COSMOLOGICAL EVOLUTION **c90**
G. Setti *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 243-253 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The cosmological evolution of quasars and of Sy type 1 nuclei as indicated from optical observations is discussed. The number versus optical flux relationship for quasars, Sy 1 nuclei, and BL Lacs is considered. Models based on pure density evolution, where the shape of the local luminosity function is rigorously preserved but the spatial density of quasars sharply decreases as a function of cosmological time, and on a pure luminosity evolution, where the local luminosity function is displaced in bulk toward higher luminosities with increasing z while the comoving density of quasars remains rigorously constant are reviewed. Author (ESA)

N85-17843# Max-Planck-Inst. fuer Extraterrestrische Physik, Garching (West Germany).
THE ROSAT ALL-SKY SURVEY IN X-RAYS **c89**
Joachim Truemper *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 254-260 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Scientific and technical aspects of the ROSAT X-ray all sky survey are outlined. It is expected to observe 100,000 quasars and Seyfert galaxies. Sensitivity is comparable to HEAO 2 medium survey overall, but can be 10 times greater around the ecliptic poles. The ROSAT X-ray optics consist of a fourfold nested mirror system of Wolter type 1 with 83 cm aperture having an intrinsic resolution of a few arcseconds. The focal plane assembly comprises two position sensitive proportional counters (PSPC) and one high resolution imager, mounted on a carousel. The PSPC is used for the sky survey. Author (ESA)

N85-17844# Leicester Univ. (England). X-ray Astronomy Group.
THE ROSAT XUV WIDE FIELD CAMERA **c89**
J. P. Pye, A. Wells, R. Willingale, and K. A. Pounds *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 261-267 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

The XUV Wide Field Camera (WFC) developed for ROSAT to extend the energy range for the sky survey from 0.15 keV down to 0.06 keV is presented. The WFC will perform an all-sky survey in the XUV band, to locate point sources to < 1 arcmin, map extended sources and the XUV background, and by use of selected filters, perform broadband photometry. It is hoped to compile an all-sky XUV catalog with from 1000 to 10,000 sources, located to 15 arcsec to 1 arcmin. Author (ESA)

N85-17845# Hamburger Sternwarte (West Germany).
AN OBJECTIVE PRISM QUASAR SURVEY WITH THE SCHMIDT TELESCOPE ON CALAR ALTO (SPAIN) **c89**
Ulrich Haug *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 268-270 (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

A Schmidt telescope with a 80 cm corrector plate, 120 cm spherical mirror 240 cm focal length, and optics with good ultraviolet transparency (UBK 7) was used to obtain photographic plates for a quasar survey. Analysis of the plates is described. Author (ESA)

N85-17846# Space Telescope Science Inst., Baltimore, Md.
ON THE UNIQUE CAPABILITIES OF THE HUBBLE SPACE TELESCOPE FOR STUDIES OF ROSAT DEEP-SURVEY X-RAY SOURCES **c89**
R. E. Griffiths *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 271-274 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

Use of the Space Telescope to establish the nature and red shift of X-ray sources found in the ROSAT deep surveys is suggested. Serendipitous or parallel mode observations with the wide-field camera on Space Telescope can be used to study one or more fields which are ideal targets for ROSAT deep survey observations. Author (ESA)

N85-17847# Max-Planck-Inst. fuer Radioastronomie, Bonn (West Germany).
VERY LONG BASE INTERFEROMETRY (VLBI) AND X-RAY OBSERVATIONS OF COMPLETE SAMPLES OF RADIO SELECTED ACTIVE GALACTIC NUCLEI **c89**
Peter Bierman and J. Anton Zensus *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 275-280 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

To improve physical understanding of active galactic nuclei a campaign to obtain VLBI and X-ray observations of complete samples, selected by flat radio spectrum was instigated. The sample from the 5 GHz 1-Jy catalog in the declination range $+10$ to $+70$ deg is discussed. The inverse Compton predictions for the expected X-ray flux densities are derived; excess over observed flux density is usually interpreted as evidence for bulk relativistic motion. However, in this sample, the most extreme source, $0923+39 = 4C39.25$, is well observed and usually taken as a standard for nonrelativistic sources. This points to serious problems in understanding relativistic sources. It is shown how the ROSAT all-sky survey combined with mm-VLBI will bring major progress in understanding of the physics of active galactic nuclei. Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N85-17848*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIRBORNE ASTRONOMY SYMPOSIUM. A SYMPOSIUM COMMEMORATING THE TENTH ANNIVERSARY OF OPERATIONS OF THE KUIPER AIRBORNE OBSERVATORY
Harley A. Thronson, Jr., ed. (Wyoming Univ., Laramie) and Edwin F. Erickson, ed. Dec. 1984 387 p refs Symp. held at Moffett Field, Calif., 11-13 Jul. 1984; sponsored by NASA and the Astronomical Society of the Pacific
(NASA-CP-2353; NAS 1.55:2353; Rept-85073) Avail: NTIS HC A17/MF A01 CSCL 03A

Airborne infrared astronomy is discussed with respect to observations of the solar system, stars, star formation, and the interstellar medium. Far infrared characteristics of the Milky Way, its center, and other galaxies are considered. The instrumentation associated with IR astronomy is addressed. For individual titles, see N85-17849 through N85-17891.

N85-17849*# E/ERG, Inc., Tucson, Ariz.
THE BEGINNINGS OF AIRBORNE ASTRONOMY, 1920 - 1930: AN HISTORICAL NARRATIVE
Eric R. Craine *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 9-25 (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

The emergence of airborne astronomy in the early twentieth century is recounted. The aerial expedition to observe the solar eclipse on September 10, 1923, is described. Observation of the total solar eclipse of January 24, 1925, is discussed. The Honey Lake aerial expedition to study the solar eclipse of April 28, 1930, is also described. Four major accomplishments in airborne astronomy during the period 1920 to 1930 are listed. Airborne expeditions were undertaken at every logical opportunity, starting a continuous sequence of airborne astronomical expeditions which was to remain unbroken, except by World War II, to the present day. Although the scientific returns of the first ten years were modest, they did exist. Interest in, and support for, airborne astronomy was generated not only among astronomers but also among the public. Albert Stevens, arguably the true father of airborne astronomy, was to become interested in applying his considerable skill and experience to the airborne acquisition of astronomical data. R.S.F.

N85-17850*# Aerospace Corp., El Segundo, Calif.
THE LEAR JET OBSERVATORY: FIFTEEN YEARS OF DISCOVERY AND REBIRTH
Ray W. Russell *In* NASA. Ames Research Center. Airborne Astron. Symp. Dec. 1984 p 26-32 refs (For primary document see N85-17848 08-89)
(Contract NAS2-11157)
Avail: NTIS HC A17/MF A01 CSCL 03A

Some of the highlights of far-infrared spectroscopy are outlined. The scientific discussion is supplemented with a few asides into technology developments. A personal look at the discovery of a particular spectral line in Orion from the Lear jet observatory is given. The rebirth of the Lear facility in time for the 1985 to 1986 apparition of Halley's comet is summarized. R.S.F.

N85-17851*# Arizona Univ., Tucson.
EXPLORATION OF THE SOLAR SYSTEM BY AIRBORNE ASTRONOMY
Harold P. Larson *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 39-57 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

The contributions of airborne astronomy to the knowledge of our solar system are reviewed, beginning in 1967 when planetary observations became a vigorous part of NASA's airborne astronomy initiatives using aircraft outfitted with 30 cm diameter telescopes for infrared observations at altitudes between 12 and 15 km. These early facilities and their successor, the Kuiper airborne observatory (KAO), profoundly influenced many areas of planetary science by providing optimized platforms for the conduct of certain types of remote sensing experiments that were incompatible with both ground-based and spacecraft environments. Specific topics reviewed include energy balance in the outer planets, the composition and structure of planetary atmospheres, and planetary ring systems. R.S.F.

N85-17852*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXTREME LIMB PROFILES OF THE SUN AT FAR INFRARED AND SUBMILLIMETER WAVELENGTHS
E. E. Becklin (Hawaii Univ.), C. Lindsey (Hawaii Univ.), F. Q. Orrall (Hawaii Univ.), J. T. Jefferies (National Optical Astronomy Observatories), M. W. Werner, and Ian Gatley (United Kingdom Infrared Telescope) *In its* Airborne Astron. Symp. Dec. 1984 p 58-62 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

Limb intensity profiles at 30, 50, 100, and 200 microns, determined from Kuiper Airborne Observatory (KAO) observations of the occultation of the solar limb during the total eclipse of July 31, 1981, are presented. Significant but gradual limb brightening was found at the longer wavelengths consistent with the 6000 K temperature-plateau structure of the model chromospheres of Vernazza, Avrett, and Loeser. The 100 and 200 micrometers limbs are extended significantly further above the visible limb than the Vernazza, Avrett, and Loeser model predicts. These results show that the solar chromosphere is strongly perturbed from gravitational-hydrostatic equilibrium to heights as low as 1000 km. These profiles can serve as a powerful diagnostic for modeling the temperature and density of chromospheric structure free from the assumption of gravitational-hydrostatic equilibrium. Author

N85-17853*# Maryland Univ., College Park.
AIRBORNE OBSERVATIONS OF COMETS **c91**
Humberto Campins *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 63-68 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

The application of airborne infrared observational techniques to cometary problems is discussed. Several areas of cometary studies which should benefit from airborne observations were identified. Special attention is given to the 1985 to 1986 apparition of Halley's comet since it is a particularly favorable opportunity to make airborne observations of a comet; however, airborne observations of other comets are also possible and highly desirable. Various types of airborne observations which can be made of comets are enumerated. R.S.F.

N85-17854*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MEASUREMENTS OF H2O IN JUPITER'S ATMOSPHERE FROM 5 MICRONS AIRBORNE OBSERVATIONS **c91**
Gordon L. Bjoraker (Arizona Univ.), Harold P. Larson (Arizona Univ.), Uwe Fink (Arizona Univ.), and Virgil G. Kunde *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 69-75 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

Measurement of the abundance and vertical distribution of H2O in Jupiter's atmosphere is discussed. Water was first detected using the Kuiper airborne observatory (KAO) and has also been observed at 5 micrometers by the Voyager infrared spectrometer, IRIS. Studies of H2O in the atmospheres of other planets require special high altitude facilities to reduce the interference of telluric H2O. Jovian H2O absorption lines are overwhelmed by terrestrial H2O at ground-based observatories but they are readily apparent in airborne spectra. Typical column abundances of H2O above ground-based telescopes are about 3000 precipitable micrometers versus only 10 pr micrometers above the KAO at the 12.5 km level. For comparison, there is about 150 pr micrometers H2O

above the 3 bar level on Jupiter. Airborne observations also take advantage of cryogenic detectors which have not been used thus far on deep space probes. R.S.F.

N85-17855*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DETECTION OF THE J-10 MANIFOLD OF THE PURE ROTATIONAL BAND OF PHOSPHINE ON SATURN c91
M. R. Haas (Mycol, Inc.), E. F. Erickson, D. Goorvitch, D. D. McKibbin, and D. M. Rank (California Univ., Santa Cruz) *In its* Airborne Astron. Symp. Dec. 1984 p 76-80 (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

The detection of the J = 10 manifold of the pure rotational band of PH3 on Saturn is reported. The observations were made from the far-infrared cooled grating spectrometer. The wavelengths and observed brightness temperatures for the full disk plus rings are 89 + or - 3 K at 97.04 micrometer, 77 + or - 3 K at 102.72 micrometer, 77 + or - 3 K at 102.94 micrometer, and 83 + or - 3 K at 105.12 micrometers. The points of 97.04 and 105.12 micrometers establish the continuum level and the two points near 103 micrometers measure the depth of the PH3 manifold. After the flux due to the rings is subtracted, the depth of the feature is 16 + or - 6 K relative to the nearby 102 K continuum. These results are compared to theoretical models which parameterize the PH3 mixing ratio as x = x sub zero (P/P sub zero)(alpha) for P < P sub zero and as x = x sub zero for P > or = P, where P is the total pressure and alpha = H/h is the ratio of the dynamical scale height (H) and the scale height for decreasing the PH3 mixing ratio (h). The parameters x sub zero, P sub zero, and h were varied, as well as the H/He mixing ratio and the pressure-temperature profile. The data are well fitted using pressure-temperature profiles. The preferred values of h, P sub zero, and x sub zero imply that there is little or no PH3 above the thermal inversion and that the mixing ratio below the inversion is consistent with PH3 being 1 to 4 times overabundant relative to the solar P/H ratio. B.W.

N85-17856*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FAR INFRARED AND SUBMILLIMETER OBSERVATIONS OF THE GIANT PLANETS
R. F. Loewenstein, D. A. Harper, R. H. Hildebrand, Jocelyn Keene, G. S. Orton, and S. E. Whitcomb *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 81-86 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

Far infrared measurements of the effective temperatures of Jupiter, Saturn, Uranus and Neptune were made. The measurements presented here cover the range from 35-1000 micrometers in relatively narrow bands. The observations at lambda > 350 micrometers were made at the 3m NASA Infrared Telescope Facility (IRTF) of the Mauna Kea Observatory; those at lambda < 350 micrometer were made on the Kuiper Airborne Observatory (KAO). All observations of Saturn were made when the ring inclination to Earth was < 1.7 deg assuring an unambiguous measurement of the flux from the disk itself. Mars was used as the calibration reference. The results represent a consistent set of calibration standards. In these measurements, it is assumed that sub b(lambda = 350 micrometers) = T sub (lambda > 350 micrometers). Measurements have been made of roughly 50% of the total flux emitted by Jupiter, 65% by Saturn, and 92% by Uranus and Neptune. These measurements therefore permit a considerable reduction in the uncertainties associated with the bolometric thermal outputs of the planets. The effective temperatures (T sub e) and the ratios of emitted to absorbed solar radiation were calculated. B.W.

N85-17857*# Massachusetts Inst. of Tech., Cambridge.
EXPLORING THE SOLAR SYSTEM WITH STELLAR OCCULTATIONS
James L. Elliot and Edward W. Dunham *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 87-93 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

By recording the light intensity as a function of time when a planet occults a relatively bright star, the thermal structure of the upper atmosphere of the planet can be probed. The main feature of stellar occultation observations is their high spatial resolution, typically several thousand times better than the resolution achievable with ground-based imaging. Five stellar occultations have been observed. The main results of these observations are summarized. Stellar occultations have been observed on Uranus, Mars, Pallas, Neptune and the Jovian Ring. B.W.

N85-17858*# California Inst. of Tech., Pasadena.
FAR-INFRARED SPECTROSCOPY OF INTERSTELLAR GAS
T. G. Phillips *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 94-113 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

Research results of far-infrared spectroscopy with the Kuiper Airborne Observatory are discussed. Both high and intermediate resolution have been successfully employed in the detection of many new molecular and atomic lines including rotational transition of hydrides such as OH, H2O, NH3 and HCl; high J rotational transitions of CO; and the ground state fine structure transitions of atomic carbon, oxygen, singly ionized carbon and doubly ionized oxygen and nitrogen. These transitions have been used to study the physics and chemistry of clouds throughout the galaxy, in the galactic center region and in neighboring galaxies. This discussion is limited to spectroscopic studies of interstellar gas. B.W.

N85-17859*# Naval Research Lab., Washington, D. C. Center for Space Research.
MULTI-SPECTRAL OBSERVATIONS OF THE STAR FORMATION: THE ROLE OF FAR INFRARED PHOTOMETRY
P. R. Schwartz, Howard A. Smith, Harley A. Thronson, Jr. (Wyoming Univ., Laramie), and Charles J. Lada (Arizona Univ., Tucson) *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 114-126 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

The study and analysis of complex astrophysical process requires a multispectral approach employing many of the tools of modern astronomy. The study of the interaction of early type stars with the interstellar medium is an example of this point. Two examples of multi-spectral studies of individual objects are reviewed. The predominent theme is the combination of high resolution far infrared photometry, radio images and millimeter-wave spectroscopy with the radio sensitive to the ionization, the millimeter-wave lines showing the structure and excitation of the gas and the far infrared providing a picture of the energetics of the dust which connects the star to the interstellar medium. Multispectral observations of FIRSSE and IRAS objects are discussed. B.W.

N85-17860*# Wyoming Univ., Laramie. Infrared Observatory.
THE ORION MOLECULAR CLOUD AT FAR-INFRARED WAVELENGTHS
Harley A. Thronson, Jr., D. A. Harper (Chicago Univ.), Howard A. Smith (Naval Research Lab.), P. R. Schwartz (Naval Research Lab.), Charles J. Lada (Arizona Univ.), J. Bally (Bell Labs.), J. H. Bieging (California Univ., Berkeley), M. Greenhouse, and R. F. Loewenstein (Chicago Univ.) *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 127-133 refs (For primary document see N85-17848 08-89)
(Grant NAG2-134)
Avail: NTIS HC A17/MF A01 CSCL 03A

A new, 34 in resolution far-infrared continuum map of Orion Molecular Cloud 1 and its environs, including M43 is presented. The source is dominated by a single, bright peak at the position of the embedded infrared cluster, with the 60 micro m flux density falling off steeply in all directions away from it. A total luminosity for IRc2 of 20,000 L(solar) is estimated, although this may be a lower limit, depending upon the transfer of radiation in the vicinity

of the object. Several condensations appear in this map, which, along with radio molecular observations, support the view that significant fragmentation has taken piace within the cloud. B.W.

N85-17861*# Chicago Univ., Ill. Dept. of Physics.
FIRST RESULTS OF SUBMILLIMETER POLARIMETRY
R. H. Hildebrand, M. Dragovan, and G. Novak *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 134-139 refs (For primary document see N85-17848 08-89)
(Grants NsG-2057; NSF AST-81-17134)
Avail: NTIS HC A17/MF A01 CSCL 03A

Airborne results of submillimeter polarization at one wavelength, 270 micro m for just three points in the sky are presented. Polarizations of 1.7% at each of two points in Orion are shown. A null result at 400 micro m from ground-based observations of Mars at opposition is also presented. A null result for W3(OH) is given. The Kleinmann-Low Nebula (KL) was chosen for one of the measurements because it is bright and polarization had been observed 10 micro m. Airborne results of submillimeter polarimetry indicate that: (1) Cool, dense interstellar clouds can emit polarized submillimeter radiation; (2) The direction of the magnetic field, averaged over the 90 beams, is the same for the Kleinmann-Low Nebula and the 400 micro m peak 1.5 south of the Nebula; and (3) The effectiveness of the grain alignment mechanism, averaged over the 90 beams, is the same for the Kleinmann-Low Nebula and the 400 micro m peak. B.W.

N85-17862*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE UNIDENTIFIED EMISSION FEATURES: A STUDY OF THE ORION BAR AND PLANETARY NEBULAE
J. Bregman, L. Allamandola, J. P. Simpson, A. Tielens, and F. Witteborn *In its* Airborne Astron. Symp. Dec. 1984 p 140-147 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

The unidentified emission features which are a group of broad emission bands found between 3.3 and 11.3 micro m in many objects which emit UV radiation and are associated with dust were studied. The features emit a substantial fraction of the energy in this wavelength range, and must therefore be an important constituent of the material around these objects. A two phase approach to the problem to better define the factors affecting the features was undertaken. The number of objects with good spectra between 3 and 13 micro m to look for correlations of the features with each other and with chemical and physical conditions were expanded and several positions in a single region, the Orion Bar, where the chemical composition was homogeneous, but the physical conditions varied are examined. E.A.K.

N85-17863*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PHOTOIONIZATION STRUCTURE OF THE ORION NEBULA
J. P. Simpson, M. R. Haas, R. H. Rubin, and E. F. Erickson *In its* Airborne Astron. Symp. Dec. 1984 p 148-154 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

The [O III] lines at 52 and 88 micro m and the [N III] line at 57 micro m were observed at 6 positions in the Orion Nebulae to probe the ionization structure of the nebula. The six positions form a line or cut south from and including the Trapezium. Electron densities and abundance ratios of N(++) were calculated and compared together with radio and optical observations. The predictions that the effects of heavy capacity in the ionized gas can cause the N(++) zone to extend appreciably beyond the O(++) zone are confirmed. E.A.K.

N85-17864*# Arizona Univ., Tucson.
THE 1.5 - 3.5 MICRON SPECTROSCOPY OF THE ORION H2 SOURCE
D. S. Davis, H. P. Larson, and R. Hofmann (Max-Planck-Inst. fuer Physik und Astrophysik) *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 164-171 refs (For primary document see N85-17848 08-89)
(Grant NGR-03-002-332)
Avail: NTIS HC A17/MF A01 CSCL 03A

A synopsis of current research with near infrared airborne spectroscopy of the Orion molecular hydrogen emission line source is presented. It is suggested that (H2) is the most abundant molecular species in the interstellar medium and is of paramount importance to understand its behavior and distribution in that medium. The H2 has no permanent electric dipole moment which precludes dipole transitions. It is, however, detected in absorption against background starlight by UV electronic transitions and in the IR through electric quadrupole rotation/vibration and pure rotation emission lines. The physical parameters of this region, in the context of their relationships to other members of the complex family of Orion objects, molecular clouds, compact IR sources, H 2 regions, and shock fronts are described. E.A.K.

N85-17865*# Naval Research Lab., Washington, D. C.
NGC 2024: MULTI-WAVELENGTH INFRARED AND RADIO OBSERVATIONS
H. A. Smith, J. Fischer, T. R. Geballe (Kapteyn Astronomical Inst.), H. A. Thronson (Wyoming Univ.), K. J. Johnston, P. R. Schwartz, T. L. Wilson (Max-Planck Inst. fuer Radioastronomie), R. M. Crutcher, C. Henkel (Max-Planck Inst. fuer Radioastronomie), and J. Bieging (California Univ., Berkeley) *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 164-171 refs (For primary document see N85-17848 08-89)
(Grant NAG2-134)
Avail: NTIS HC A17/MF A01 CSCL 03A

A series of far-infrared maps obtained on the KAO find the total IR luminosity of NGC 2024 is to the 4th power L, and show a peak in flux density and optical depth about 1' south of IRS 2. High resolution spectra of IRS 2 in Brackett alfa and Pfund gamma indicate the presence of an optically thick wind with M approx. 7 x 10 to the minus 7 power M sub yr to minus 1 power, from which we infer that IRS 2 is unable to supply the luminosity observed. A six centimeter continuum map peaks near the location of the far-infrared peak and confirms it as a likely site for a source to provide this luminosity. Maps in HCN, CS, and H2CO show the gas is dense in the direction of the far IR peak. Velocity analysis shows the H2 region created by the far IR source and IRS 2 forms an expanding bubble in front of which the H2CO is seen in absorption, and which is bounded in the south and behind by dense material. E.A.K.

N85-17866*# Texas Univ., Austin.
FAR-INFRARED PHOTOMETRY OF LOW-MASS PRE-MAIN-SEQUENCE STARS WITH BROAD CO WINGS
Neal J. Evans, II, Russel M. Levreault, and Paul M. Harvey *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 172-179 refs (For primary document see N85-17848 08-89)
(Grants NAG2-253; NAG2-67; NSF AST-83-12332)
Avail: NTIS HC A17/MF A01 CSCL 03A

A sample of 14 low-mass premain-sequence stars were studied in the far-infrared. There is evidence for outflowing material around twelve of these stars; in most cases the evidence includes broad wings on the profiles of the CO J=2 to 1 line. Ten of the objects were detected (> 5 sigma) at 100 micro, and seven were mapped at 50 and 100 micro. The far-infrared emission makes a significant contribution to the total luminosity of the objects. It is found that the force available from radiation pressure is not sufficient to drive the outflows. Any process which taps the same energy source as does the present stellar luminosity must have high efficiency. E.A.K.

N85-17867*# Texas Univ., Austin.
HIGH SENSITIVITY, HIGH ANGULAR RESOLUTION FAR-INFRARED PHOTOMETRY FROM THE KAO
D. Lester, Paul M. Harvey, Bruce A. Wilking, and M. Joy *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 180-185 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

Most of the luminosity of embedded sources is reemitted in the far-infrared continuum. Measurements in the far-infrared are essential to understand the energetics of the interstellar medium, and of star formation regions in particular. Measurements from the KAO, are made in diffraction limited beams that sample a spatial scale considerably smaller than that given by IRAS. The KAO instrument technology has matured to the point that the single scan limiting flux of IRAS at 100 micro can be reached in a diffraction limited beam in a single typical KAO observing leg. The far-infrared photometer system and selections of recent observations are presented. E.A.K.

N85-17868*# Chicago Univ., Ill. Dept. of Physics.
STAR FORMATION IN GLOBULES **c90**
J. A. Davidson *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 186-193 refs (For primary document see N85-17848 08-89)
(Grant NsG-2057; NSF AST-81-17134)
Avail: NTIS HC A17/MF A01 CSCL 03C

The low mass star formation process was studied by application of submillimeter and supplementing far-infrared continuum observations by molecular line observations to the discovery and analysis of compact cores in molecular clouds with low luminosity. These dense regions are likely to be the sites where a cloud has recently collapsed or is still collapsing to form a star. Observations show that nonisotropic effects must play an important role in star formation. Four low luminosity sources embedded in the clouds L1551, B335, L1455 and L723 are presented. All these sources exhibit collimated bipolar molecular outflows of varying strengths. Data on the outflows are combined with determinations of mass, luminosity and temperature of the dust in the dense cores surrounding these embedded energy sources, to infer the evolutionary stage of the object. The possible role of the cores in channeling or generating the outflow is examined. E.A.K.

N85-17869*# Rensselaer Polytechnic Inst., Troy, N. Y.
FAR INFRARED OBSERVATIONS OF MOLECULAR CLOUDS IN THE OUTER GALAXY
Kathryn N. Mead, Marc L. Kutner, and Neal J. Evans (Texas Univ., Austin) *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 194-198 refs (For primary document see N85-17848 08-89)
(Grants NAG1-98; NAG1-99)
Avail: NTIS HC A17/MF A01 CSCL 03A

The existence of molecular clouds in the outer galaxy allows the study of star formation at large galactocentric radii. The study of these clouds has two aims. A systematic survey is underway to study the large scale distribution of the molecular clouds outside the solar circle. To understand the physical conditions in the clouds, fully sampled maps were (and are being) made in CO and other molecules. The continuum emission is also being mapped. The main objective in doing an infrared study was to obtain information on the luminosity of the stars formed in these clouds. Assuming all energy radiated from the star is absorbed by the dust and then re-radiated in the infrared, one can get an estimate of the star's luminosity by integrating the flux over the source and converting it to a luminosity. Until these observations, the only way of judging stellar luminosities was from peak CO temperatures. Accounting for beam dilution, Kutner and Mead inferred from these that the heat sources were late B or later stars. The Kupier Airborne Observatory was used to search 9 sources in 5 clouds for far infrared emission. R.J.F.

N85-17870*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CIRCUMSTELLAR DUST DISKS AROUND YOUNG STARS **c90**
Martin Cohen, Richard Schwartz (Missouri Univ., St. Louis), Paul M. Harvey (Texas Univ., Austin), and Bruce A. Wilking (Texas Univ., Austin) *In its* Airborne Astron. Symp. Dec. 1984 p 199-203 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03C

Kuiper Airborne Observatory observations of several resolved far-infrared structures that are likely to represent disks formed during the process of the collapse of a cloud to form a star are discussed. An infrared radiation nebula, star HH57, and SVS13 were studied. Forty seven and 95 micron maps of far infrared radiation are given. R.J.F.

N85-17871*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CARBON STARS: THERE IS NO SUCH THING AS A DEAD LEG **c90**
J. H. Goebel *In its* Airborne Astron. Symp. Dec. 1984 p 204-223 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

The spectra of carbon stars is discussed. Spectral flux curves, molecular bands, molecular absorptions, stellar temperatures, and comparison of emission features in various carbon stars are among the topics considered. R.J.F.

N85-17872*# Cornell Univ., Ithaca, N.Y.
MID-INFRARED SPECTROSCOPY OF PLANETARY NEBULAE
M. A. Shure, J. R. Houck, T. Herter, G. E. Gull, and P. Graf *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 224-232 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

The application of infrared spectral lines observed in part of the broadened spectral range (18 to 36 microns) to planetary nebula studies is discussed. Infrared spectral lines in the mid-infrared supply information about planetary nebulae which both supplement and complement optical results. Their utility lies mainly in the insensitivity of the line intensities to temperature variations or uncertainties, in contrast to the behavior of optical emission. This in turn leads to more accurate ionic abundances than presently available from optical lines. Although densities from optical line ratios are not very sensitive to temperature, the lines are weighted toward regions of higher temperatures. A comparison with infrared densities from the same ions therefore provide clues to the density and/or temporature variations within nebulae. Temperatures from OIV and NeV ions show a part of high-excitation nebulae previously inaccessible. They verify the picture of physical processes in the HeIII zone. R.J.F.

N85-17873*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SPECTRAL CHARACTERISTICS OF DUST IN PLANETARY NEBULAE
H. Moseley and R. F. Silverberg *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 233-239 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

Some carbon-rich planetary nebulae exhibit a strong broad emission feature beginning at Lambda which is approximately 24 microns and extending to Lambda greater than 30 microns. Thirty to 55 micron spectrophotometry of Ic 418 and NGC 6572, both of which have the strong broad emission feature, allow the wavelength dependence of the emissivity of the dust responsible for the feature to be defined. Comparison with laboratory spectra of candidate materials which are likely to condense in a carbon-rich environment suggests that the feature arises from MgS. The implications of such a strong feature arising from a relatively minor dust constituent are discussed. The environment in which MgS may be found is considered. It is speculated that MgS will be seen in objects with C/O ratios only slightly greater than one, but not in extremely carbon rich objects. In objects with much higher carbon abundances, the formation of CS consumes S so that insufficient MgS can form to exhibit the strong feature. These observations imply that the emergent far infrared spectrum of carbon-rich objects are very different depending on the abundance of the low temperature condensate MgS. R.J.F.

N85-17874*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INTERSTELLAR GRAIN MANTLES **c90**
A. Tielens, F. Witteborn, J. Goebel, J. Bregman, L. Allamandola,

and L. B. dHendecourt (Leiden Univ.) *In its* Airborne Astron. Symp. Dec. 1984 p 240-246 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

Techniques for determining the composition of small dust grains in interstellar matter are discussed. The best way to study the composition of interstellar grain mantles is by infrared spectroscopy. The absorption features in a complete infrared spectrum from 2 to 15 microns can be used as fingerprints to identify the absorbing molecule. Ground-based observations around 3 microns confirmed the presence of H2O ice in interstellar grain mantles, through the detection of the 3.08 micron OH stretching vibration. The detection of other molecules, in particular the carbon bearing molecules, is however hampered by atmospheric absorption in the 5-8 micron region and the presence of the strong ice and silicate bands, which dominate the 3 and 10 micron region respectively. Kuiper Airborne Observatory observations of the 5-8 micron region of the spectrum are therefore extremely important to determine the composition of interstellar grain mantles. The 5 to 8 micron spectra of molecular cloud sources was obtained using a 24 detector grating spectrometer. An important characteristic of this spectrometer is that the whole spectrum is obtained simultaneously. It is therefore relatively easy to correct for atmospheric transmission. R.J.F.

N85-17875*# Chicago Univ., Ill.
FAR INFRARED EMISSION FROM GALAXIES
D. A. Harper *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 247-254 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

The relationship between far infrared sources and star formation is discussed. It is argued that the relationship of star formation to compact nuclear sources and the relative importance of these fundamentally different types of activity in the most luminous galaxies is still unclear. Although there is evidence for a general correlation between far infrared emission and the amount of interstellar matter present, there are also indications of significant deviations from a simple stochastic model. R.J.F.

N85-17876*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FAR INFRARED CONTINUUM EMISSION FROM THE GALACTIC CENTER **c90**
Michael W. Werner, Eric Becklin (Hawaii Univ.), and Ian Gatley (United Kingdom Infrared Telescope Unit) *In its* Airborne Astron. Symp. Dec. 1984 p 255-259 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

High angular resolution observations of the Galactic center from the Kuiper Airborne Observatory are discussed. The results of multi-wavelength mapping reveal that the 30 micron distribution shows a single peak which lies between two emission lobes seen at the longer wavelengths. The 30 micron emission is known from ground-based measurements to peak at the galactic center. The far-infrared color temperature and luminosity also peak at the position of the galactic center, and the observations show a strong temperature gradient away from the galactic center in all directions. Consideration of these data leads to the conclusion that the dust density decreases inward over the central 3 pc of the Galaxy, and that the central parsec of the Galaxy is remarkably devoid of dust, so that optical and ultraviolet photons may traverse it freely. The inferred total luminosity of the sources that heat the dust radiating the far-infrared emission from the central few pc of the Galaxy is 1 to 3 x to the 7th power L(Sun). It is probable that these same sources are responsible for ionizing the plasma at the galactic center. M.G.

N85-17877*# Cornell Univ., Ithaca, N.Y.
THE 157 MICRON (C II) LUMINOSITY OF THE GALAXY
Gordon J. Stacey, Paul J. Viscuso, Charles E. Fuller, Noel T. Kurtz, and Martin O. Harwit *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 260-265 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

The diffuse far infrared (C II) emission of several regions of the Galactic plane were sampled. Mechanisms for the excitation of carbon ions are discussed in reference to the role of carbon ion transitions in cooling diffuse atomic hydrogen. Observations indicate that the C II emission probably arises at the edges of giant molecular clouds and appears to have localized knot-like features. The total C II luminosity of the Galaxy is approximately 6 to 10 to the 7th power L(solar). M.G.

N85-17878*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VARIATION OF OXYGEN AND NITROGEN ABUNDANCES IN THE GALAXY **c90**
H. Dinerstein (Texas Univ., Austin), D. Lester (Texas Univ., Austin), M. W. Werner, D. M. Watson (California Inst. of Tech.), R. L. Genzel (California Univ., Berkeley), and R. H. Rubin *In its* Airborne Astron. Symp. Dec. 1984 p 266-271 refs (For primary document see N85-17848 08-89)
(Contract NCA2-OR781-201)
Avail: NTIS HC A17/MF A01 CSCL 03B

Results from a program of far-infrared observations of oxygen and nitrogen in Galactic planetary nebulae and H II regions are presented and discussed. Results indicate that the N/O abundance increases inward towards the galactic center, with a steep rise at the outer edge of the 5 kpc ring of active star-formation. The N/O abundances in the inner galaxy are about 2 to 3 times higher than in H II regions in the solar neighborhood and outer galaxy. M.G.

N85-17879*# Minnesota Univ., Minneapolis.
FAR IR OBSERVATIONS OF THE MAGELLANIC CLOUDS
Terry Jay Jones, A. R. Hyland (Mount Stromio and Siding Spring Observatory), Paul M. Harvey (Texas Univ.), Bruce A. Wilking (Texas Univ.), Marshal Joy (Texas Univ.), and J. A. Thomas (Melbourne Univ.) *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 272-276 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

Several Large Magellanic and Small Magellanic Cloud H II regions were observed at 50 and 100 microns. Observations were made on three flights of the Kuiper Airborne Observatory using a six channel detector system. Fully sampled maps were made simultaneously at both wavelengths. The integrated properties of the H II regions are listed and interpretations of the results regarding stellar formation are presented. M.G.

N85-17880*# Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
DUST RERADIATION FROM NGC 6946 **c90**
J. Smith, D. A. Harper, and R. F. Loewenstein *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 277-286 refs (For primary document see N85-17848 08-89)
(Grants NGR-14-001-227; NAG2-252)
Avail: NTIS HC A17/MF A01 CSCL 03B

Far infrared measurements of dust reradiation for the spiral galaxy NGC 6946 are presented. The measurements consist of maps and an energy distribution, all made with a resolution of 49 sec. Effective wavelengths are 120 and 170 microns for the maps and 60, 120, and 170 microns for the energy distribution. Much of the reradiating dust has a temperature of 20 K. The amount of starlight reradiated at far infrared wavelengths is approx. 6 x 10 to the 10th power L(solar) or about half the total amount of starlight produced by the nucleus and disk of NGC 6946. A bright nuclear peak centered on a 5' wide disk describes the reradiation morphology at 170 microns. The disk contributes approx. 90% of the total reradiation; the 49 sec diameter region centered on the nucleus gives the small remainder. The morphology of reradiated starlight is compared to the familiar starlight morphology observed at optical wavelengths. M.G.

N85-17881*# Naval Research Lab., Washington, D. C.
STARBURSTS IN GALAXIES: IMPLICATIONS OF MOLECULAR AND FAR-INFRARED OBSERVATIONS c93
L. J. Rickard, P. M. Harvey (Texas Univ.), and L. Blitz (Maryland Univ.) *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 287-291 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03C

Starburst galaxies are defined in several ways (colors, optical spectroscopic signatures, and excess radio flux), and observational evidence indicating that episodes of rapid star formation occur in many galaxies with active nuclei is presented. There is a good correlation of 100 micron luminosity with CO emission, and of both quantities with excess nonthermal radio flux. This fact requires some linkage between central and global star formation rates. In addition, the presence of starbusts distorts the appearance of the molecular gas in which they occur. Using far infrared color temperatures and comparisons of CO isotopes, it is shown that the strong (12)CO emission in these galaxies does not accurately trace the H2 distribution, probably because the starburst raises the avearage temperature of the cloud ensemble. M.G.

N85-17882*# California Univ., Berkeley. Dept. of Physics.
FAR-INFRARED SPECTROSCOPY OF GALAXIES: THE 158 MICRON C(+) LINE
M. K. Crawford, R. L. Genzel, C. H. Townes, and D. M. Watson (California Inst. of Tech.) *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 292-297 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

The C II 158 micron fine structure line in six gas rich galaxies was investigated. These data are combined with other measurements of the C II line (in various galactic sources) and are compared to studies of the CO J = approaches O rotational line at 2.6 mm, the H I 21 cm line, and the far infrared continuum emission in the same objects. M.G.

N85-17883*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FAR INFRARED SPECTROSCOPY OF (O III) IN M82
P. Duffy, E. F. Erickson, M. R. Haas (Mycol, Inc.), and J. R. Houck (Cornell Univ.) *In its* Airborne Astron. Symp. Dec. 1984 p 298-299 refs (For primary document see N85-17848 08-89)
(Grant NGT-05-020-804)
Avail: NTIS HC A17/MF A01 CSCL 03A

Emission lines at 52 and 88 micron from O III in the galaxy M82 were observed with the cooled grating spectrometer aboard the Kuiper Airborne Observatory. Raw spectra were corrected for telluric water vapor absorption, instrument response function, and relative detector response by ratioing to a spectrum of Saturn or Mars taken on the same flight. An average electron density Pn regions where oxygen is doubly ionized was derived. The electron density calculated for M 82 is significantly lower than those found in the galaxy using the same method. Results suggest that observations of the galaxy made from a great distance would yield a higher electron density than observed in M82. B.G.

N85-17884*# Max-Planck-Inst. fuer Radioastronomie, Bonn (West Germany).
INTERPRETATION OF THE FAR INFRARED EMISSION FROM OUR EXTERNAL GALAXIES
E. Kruegel and P. Mezger *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 300-304 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

Stellar mathematical models of various spectral types embedded in gas of different densities were utilized to investigate the nature of the sources which heat the warm and hot dust. B.G.

N85-17885*# Massachusetts Inst. of Tech., Cambridge.
IMAGE QUALITY ON THE KAO
E. W. Dunham, J. L. Elliot, R. L. Baron, and R. G. Hohlfield (Northeastern Univ.) *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 305-312 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

Three flights of the Kuiper Airborne Observatory (KAO) were taken to study the cause of the point spread function (PSF) degradation. The preliminary conclusions are: (1) the KAO point spread function decreases in size with elapsed time at altitude; (2) image motion is occasionally comparable to the size of the image, but is usually a sub-arcsecond effect; and (3) star images show small scale internal structural changes on a 200 microsecond timescale. B.G.

N85-17886*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A FAR INFRARED ECHELLE SPECTROMETER FOR THE KUIPER AIRBORNE OBSERVATORY
E. F. Erickson, J. R. Houck (Cornell Univ.), M. O. Harwit (Cornell Univ.), D. M. Rank (Lick Observatory), M. R. Haas, D. J. Hollenbach, J. P. Simpson, G. C. Augason, and D. D. McKibbin *In its* Airborne Astron. Symp. Dec. 1984 p 313-319 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

A liquid-helium-cooled grating spectrometer (CGS) is being developed as a facility instrument for the Kuiper Airborne Observatory (KAO), primarily to study for infrared lines originating in the interstellar medium. A maximum resolving power of approximately 6000 is achieved by means of a 45 cm long Echelle grating and is optically capable of operating in the spectral range from 25 to 300 microns. An array of detectors is used to simultaneously measure a line and the adjacent continuum from astronomical sources. Currently six detectors allow measurements in the 30 to 120 micron spectral band. The instrument, its operation, and its performance are described. B.G.

N85-17887*# California Univ., Berkeley. Space Sciences Lab.
A 150 MICRON HETERODYNE SPECTROMETER FOR AIRBORNE ASTRONOMY
A. Betz and J. Zmuidzinas *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 320-329 refs (For primary document see N85-17848 08-89)
(Grants NAG2-254; NSF AST-82-11520)
Avail: NTIS HC A17/MF A01 CSCL 03A

The advantages of heterodyne detection for high resolution spectroscopy were long known to radio astronomers. Heterodyne spectroscopy was productive at submillimeter wavelengths, but its extension to shorter submillimeter and far-infrared (FIR) wavelengths was hampered by inadequate mixers and local oscillators. A significant advance in FIR receiver technology was demonstrated using an optically-pumped FIR laser and a Schottky-diode mixer. Any similar spectrometer intended for airborne observations at shorter wavelengths must be compatible with the more restrictive aircraft environment. The effectiveness of the design of a FIR heterodyne spectrometer was verified in ground-based observations with a prototype version. The airborne successor is even more compact, and has a much broader spectral coverage. Flight tests are scheduled for the new instrument. B.G.

N85-17888*# Max-Planck-Inst. fuer Radioastronomie, Bonn (West Germany).
TUNABLE HETERODYNE RECEIVER FROM 100 MICRON TO 1,000 MICRON FOR AIRBORNE OBSERVATIONS c33
H. P. Roeser, R. Wattenbach, and P. vanderWal *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 330-334 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

Interest in high resolution spectrometers for the submillimeter wavelength range from 100 micron to 1,000 micron is mostly stimulated by molecular spectroscopy in radioastronomy and atmospheric physics, and by plasma diagnostic experiments. Schottky diodes in waveguide mixer technology and InSb-hot electron bolometers are successfully used in the 0.5 to a few millimeter range whereas tandem Fabry-Perot spectrometers combined with photoconductive detectors (Ge:Sb and Ge:Ga) are

used for the 100 micron range. Recent research on heterodyne spectrometers, with Schottky diodes in an open structure mixer and a molecular laser as local oscillators, which can be used over the whole wavelength range is summarized. Author

N85-17889*# Chicago Univ., Ill.
INSTRUMENTATION FOR SUBMILLIMETER POLARIMETRY
c35
Mark Dragovan and Giles Novak *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 335-340 refs Sponsored in part by NSF (For primary document see N85-17848 08-89)
(Grant NsG-2057)
Avail: NTIS HC A17/MF A01 CSCL 14B

During the last two years three instruments were built and operated for detection of polarization in the submillimeter to millimeter wavelength bands. In principle, simply rotating a polarizing grid in front of the detector would be sufficient to determine the state of linear polarization. In practice severe systematic problems are found with this approach. Everything in the light path has potential for inducing polarization. The telescope, apertures in the lightpath, and the Winston light collectors all introduce systematic errors. (The polarization/depolarization induced by these devices is due to diffraction and the finite conductivity of the metals used). Two of the polarimeters are for use on the KAO; the third is for the IRTF on Mauna Kea. The airplane polarimeters, M1 and M2, were specifically designed to minimize the systematic errors. The ground based polarimeter uses our f/35 photometer with an external polarizing grid as the analyzer. With all three instruments the key to success is the data collector and analysis scheme. Author

N85-17890*# Max-Planck-Inst. fuer Radioastronomie, Bonn (West Germany).
A NEW GENERATION OF SUB mm TELESCOPES, MADE OF CARBON FIBER REINFORCED PLASTIC
P. Mezger, J. W. M. Baars, and B. L. Ulich (Arizona Univ., Tucson) *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 341-347 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

Carbon fiber reinforced plastic (CFRP) appears to be the material most suited for the construction of submillimeter telescopes (SMT) not only for ground-based use but also for space applications. The accuracy of the CFRP reflectors needs to be improved beyond value of the 17 micron rms envisaged for the 10 m SMT. B.G.

N85-17891*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIRTF: THE NEXT STEP
Frederic C. Gillett (Kitt Peak National Observatory) and Michael W. Werner *In its* Airborne Astron. Symp. Dec. 1984 p 348-362 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03A

The space infrared telescope facility (SIRTF) is a 1-meter class, long duration, super fluid helium-cooled telescope in Earth orbit, equipped with imaging and spectroscopic instrumentation operating over the wavelength range from 1.8 to 700 microns. The SIRTF will be the most powerful tool available for studying many of the compelling problems in contemporary astrophysics and for further exploration of the infrared sky demonstrated by IRAS. Adaptation of IRAS technology (cryogenics, optics, and pointing and guidance) is discussed. B.G.

N85-17892*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PROCEEDINGS OF THE WORKSHOP ON IMPROVEMENTS TO PHOTOMETRY
William J. Borucki, ed. and Andrew T. Young, ed. Nov. 1984 260 p refs Workshop held in San Diego, Calif., 18-19 Jun. 1984 (NASA-CP-2350; Rept-85052; NAS 1.55:2350) Avail: NTIS HC A12/MF A01 CSCL 03A

The purposes of the workshop were to determine what astronomical problems would benefit by increased photometric precision, determine the current level of precision, identify the processes limiting the precision, and recommend approaches to improving photometric precision. Twenty representatives of the university, industry, and government communities participated. Results and recommendations are discussed. For individual titles, see N85-17893 through N85-17912.

N85-17893*# San Diego State Univ., Calif.
HISTORY OF PHOTOMETRIC PRECISION
Andrew T. Young *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 8-14 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

A history of photometric precision is given. The fixing of the scale of stellar magnitudes, progress toward precision and accuracy, and the use of photography are discussed. R.J.F.

N85-17894*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PHOTOMETRIC PRECISION NEEDED FOR PLANETARY DETECTION
W. J. Borucki *In its* Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 15-27 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

The photometric detection of Earth-sized planets in other solar systems requires a measurement precision of between 1 part in 100,000 and 2 parts in 1,000,000 depending on whether the stellar flux reduction or change in the color that is monitored. Because of atmospheric limitations caused by scintillation and differential extinction, a ground-based system would require a 9-m aperture telescope, whereas a 1-m aperture would be sufficient for a spaceborne system. A three-channel prototype photometer is being developed to test concepts and components that are needed to achieve the required precision. R.J.F.

N85-17895*# Nice Univ. (France). Dept. d'Astrophysique.
FIVE-MINUTE P MODES DETECTED IN DOPPLER SHIFT MEASUREMENT ON ALPHA CENTAURI
Eric Fossat, Gerard Grec, and Bernard Gelly *In* NASA. Ames Research Center Proc. of the Workshop on Improvement to Photometry Nov. 1984 p 28-32 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

A spectrophotometer using the principle of optical resonance spectroscopy, designed for the goal of identifying radial and weakly non radial eigenmodes in the five minute range in the case of stars, is discussed. The conclusion of the first test of this new instrument was that if the observation can be photon noise limited (i.e., in total absence of any instrumental source of noise), the five-minute solar oscillation could still be detected by removing the Sun far enough for its magnitude to become zero or one. Such a situation is very closely represented by the observation of Alpha Centauri A, because it is a G2 V star, very similar to the Sun, with a mass of 1.1 in solar unit. Six nights were granted to this program on a 3.6m telescope, from 22 to 28 May 1983. Two and half nights provided over 20 hours of data of photometric quality good enough for analysis. R.J.F.

N85-17896*# Texas Univ., Austin.
HIGH PRECISION MEASUREMENT OF STELLAR RADIAL VELOCITY VARIATIONS
William D. Cochran *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 33-42 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

A prototype instrument for measurement of stellar radial velocity variations to a precision of a few meters per second is discussed. The instrument will be used to study low amplitude stellar non-radial oscillations, to search for binary systems with large mass ratios, and ultimately to search for extrasolar planetary systems. The

instrument uses a stable Fabry-Perot etalon, in reflection, to impose a set of fixed reference absorption lines on the stellar spectrum before it enters the coude spectrograph of the McDonald Observatory 2.7-m telescope. The spectrum is recorded on the Octicon detector, which consists of eight Reticon arrays placed end to end. Radial velocity variations of the star are detected by measuring the shift of the stellar lines with respect the artificial Fabry-Perot lines, and correcting for the known motions in the solar system. R.J.F.

N85-17897*# California Univ., La Jolla.
A SURVEY FOR PHOTOMETRIC VARIABILITY FROM SPACE
Hugh S. Hudson *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 43-54 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

A survey for photometric variability in a wide variety of astronomical objects would produce much new information about their interiors and dynamics. Reasons for such a survey are given, as well as an example of the solar-constant variations that can be used as a guide to what may be expected from main-sequence stars. A concept for a satellite dedicated to a survey of photometric variability is proposed. R.J.F.

N85-17898*# Cape Town Univ. (South Africa). Dept. of Astronomy.
THE GROUND BASED PHOTOMETRIC LIMITATIONS TO THE SEARCH FOR LIGHT VARIATIONS DUE TO 5-MINUTE SOLAR-TYPE OSCILLATIONS IN OTHER STARS
D. W. Kurtz *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 56-67 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

High speed photometric observations obtained with a single channel photometer on the South African Astronomical Observatory 0.5-m and 1.9-m telescopes are presented. It is argued that the dominant source of noise at periods near 5 minutes is sky transparency variation rather than scintillation. For bright stars this means that, at this period, increased telescope aperture does not improve photometric accuracy. It is claimed that ground based photometric observations cannot reach accuracies sufficient to study solar-type oscillations in other stars. Such observations must be made from space. Recommendations for improving ground based observations are made. R.J.F.

N85-17899*# Nice Univ. (France). Dept. d'Astrophysique.
ATMOSPHERIC LIMITATIONS IN STELLAR SEISMOLOGY: SHOULD ONE MEASURE RADIAL VELOCITY OR BRIGHTNESS FLUCTUATIONS?
Eric Fossat *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 68-78 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

Low degree p-modes of the Sun have been measured in spatially integrated sunlight (the Sun as a star) both in Doppler shift and in intensity fluctuations. These observations are a good starting point for the discussion of the best way to collect equivalent data on other stars. It is assumed that the Sun is removed far enough in space to become an ordinary star of magnitude zero to one. Evidently another star will oscillate with different frequencies and different amplitudes, but some reference must be made to start with. Using this scheme, a detailed investigation of the limitations of observational accuracy in the search for global p-modes is made. The sources of noise stand in the Sun itself, in the instrumentation, in the observing time duration, in the corpuscular nature of the light and mostly in the Earth atmosphere in the case of ground based observations. B.W.

N85-17900*# Lowell Observatory, Flagstaff, Ariz.
A STATISTICAL EVALUATION OF THE LIMITATIONS OF SINGLE-CHANNEL INTERMEDIATE-BAND PHOTOELECTRIC STELLAR PHOTOMETRY
G. W. Lockwood *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 79-87 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

Error distribution in differential photometry for a moving solar system object is investigated. The results of differential photometry of several dozen pairs of planetary comparison stars observed since 1972 are reviewed. Each pair of stars was observed along with the corresponding planet or satellite, typically about ten times during the course of a single apparation lasting about four months. The comparison stars are chosen to bracket the opposition position of the planet, the expected opposition magnitude, and solar color. In practice, this means that the range of spectral type was mid-F to early K, the range of B-Y color was about 0.25 to 0.95 mag, the range of differential magnitude was less than 2 mag but most often less than 1.0 mag, and the difference in declination was typically less than 3 deg. The difference in air mass at meridian transit was usually less than 0.03, and rarely exceeded 0.01. Hence, differential extinction effects are negligible, except under extraordinary conditions. B.W.

N85-17901*# San Diego State Univ., Calif. Dept. of Astronomy.
THE ATMOSPHERIC EXTINCTION PROBLEM
Ronald J. Angione *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 88-107 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

Atmospheric extinction, which is one of the main causes of errors in photometry is investigated. The incorrect determination of the extinction coefficient, and its variability, leads to an erroneous measurement. An erroneous extinction coefficient can arise from a number of causes including: (1) instrumental instabilities; (2) too few data points; (3) temporal changes in the atmosphere; and (4) differing airmasses due to components with different scale heights. While it is true that differential measuring techniques can achieve a precision approaching 0.1 percent, at higher levels of precision all of the above causes will be significant sources of error. The conditions that must be met in order to properly determine and correct for atmospheric extinction are discussed. B.W.

N85-17902*# Geneva Univ. (Switzerland).
REDUCTION TO OUTSIDE THE ATMOSPHERE AND STATISTICAL TESTS USED IN GENEVA PHOTOMETRY
F. Rufener *In* NASA. Ames Research Center. Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 108-123 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

Conditions for creating a precise photometric system are investigated. The analytical and discriminatory potentials of a photometry obviously result from the localization of the passbands in the spectrum; they do, however, also depend critically on the precision attained. This precision is the result of two different types of precautions. Two procedures which contribute in an efficient manner to achieving greater precision are examined. These two methods are known as hardware related precision and software related precision. B.W.

N85-17903*# Vassar Coll., Poughkeepsie, N.Y.
GAIN INSTABILITIES IN PHOTOMULTIPLIERS: HOW ACCURATE ARE PHOTON COUNTING MEASUREMENTS?
W. A. Rosen and F. R. Chromey *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 125-136 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

Experiments performed on five commercially available photomultiplier tubes indicate that gain instabilities can be an important source of error in photon counting measurements at the 1% level. It is shown that the error cannot be significantly reduced by standard differential measurement techniques. Analysis of time variations in the pulse height distribution is shown to be a sensitive diagnostic tool for the measurement of gain variations. Using this technique it is found that gain variations occur at counting rates

as low as 100 Hz. It is argued that such errors will be present at some level in all tubes. Several calibrating schemes capable of reducing the error to below the 0.1% level are discussed. B.W.

N85-17904*# Arizona Univ., Tucson. Lunar and Planetary Lab.
A CCD SYSTEM FOR PHOTOMETRY OF DIRECT AND SPECTROSCOPIC IMAGES
J. E. Frecker, T. Gehrels, R. S. McMillan, W. J. Merline, M. L. Perry, J. V. Scotti, and P. H. Smith *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 137-151 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

A charge-coupled device (CCD) for direct imagery at the focus of a ground-based telescope and for high dispersion spectroscopy of stars is evaluated. The CCD is an RCA SID 53612 thinned, buried channel array of 512x320 30-micron square pixels that are back-illuminated and refrigerated to about -60 C in a rugged, RF-shielded vacuum housing. The double-correlated sampling (integrator) readout system, the Z80 microprocessor readout control system, and the data collection system are described. The readout noise is 120 electron-hole pairs (ehp) per pixel per readout, the thermal dark current is 50 ehp/pixel/sec, and the scale of the 12-bit analog-to-digital converter is 25 ehp/AD unit. Unique features of this system are compared to other astronomical implementations of the same model of CCD. B.W.

N85-17905*# California Univ., Berkeley. Dept. of Astronomy.
CCDs: THEIR CAUSE AND CURE
S. Djorgovski *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 152-176 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

Charge coupled devices (CCDs) have opened new horizons in the optical astronomy. Most of the presently existing astronomical CCD systems are oriented and designed primarily for work on faint objects. The use of CCDs for high precision work on bright objects remains to be explored. Issues and problems specific to (CCDs) are covered in detail. The important structural characteristics of CCDs are that they are integrating, self scanned, photon counting (one selection for each detected photon), solid state devices. The typical physical sizes are of the order of 1 - 3 cm, and typical raster formats of 500x500 pixels (TI), 320x512 (RCA), 385x576 (GEC), 800x800 (TI), and 1500x1500 (GEC) should be available soon. Typical (and optimal) operating temperatures are around -100 C, with liquid N2 as the most common coolant. Some CCDs are physically warped. This causes focus variations across the surface, which amount to a spatially variable PSF. Other relevant properties of CCDs as detectors and a comparison with some other astronomical detectors are given. B.W.

N85-17906*# South African Astronomical Observatory, Sutherland.
TIME SERIES PHOTOMETRY WITH A CCD CAMERA
Alistair R. Walker *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 177-181 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

Time series observations of a field in the cluster NGC 4755 with a CCD camera are used to show that differential photometry between stars on the CCD frame is limited in accuracy mostly by photon statistics, over a 5 magnitude range. Scintillation noise appears to be almost entirely suppressed. The maximum accuracy possible is limited by the storage capacity of the CCD to about 0.001 mag. Author

N85-17907*# Texas Univ., Austin.
THE USE OF SELF-SCANNED SILICON PHOTODIODE ARRAYS FOR ASTRONOMICAL SPECTROPHOTOMETRY
Anita L. Cochran *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 182-192 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

The use of a Reticon self scanned silicon photodiode array for precision spectrophotometry is discussed. It is shown that internal errors are + or - 0.003 mag. Observations obtained with a photodiode array are compared with observations obtained with other types of detectors with agreement, from 3500 A to 10500 A, of < 1%. The photometric properties of self scanned photodiode arrays are discussed. Potential pitfalls are given. M.G.

N85-17908*# National Bureau of Standards, Washington, D.C.
PHOTODIODES FOR ASTRONOMICAL STELLAR RADIOMETRY
A. R. Schaefer *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 193-202 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

The theory of photodiodes and their application to radiometric measurements is reviewed. Some suggestions concerning photodiode detectors for use in stellar radiometric measurements are given. Quantum efficiency, linear response characteristics, and noise current values of silicon photodiodes are considered. M.G.

N85-17909*# Stanford Univ., Calif. Center for Space Science and Astrophysics.
PHOTOMETRY WITH MULTI-ANODE MICROCHANNEL ARRAYS (MAMAs) AND CHARGE INJECTION DEVICES (CIDs)
J. Gethyn Timothy *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 203-215 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

The characteristics of two kinds of detectors are summarized with emphasis on those aspects that would affect their use in high accuracy astronomical photometry. The first type, the multianode microchannel arrays (MAMA), are a family of pulse counting array detectors. Components and operation principles are reviewed and quantum efficiency, noise characteristics, and dynamic range characteristics are described. The second type, charge injection devices (CID), are discussed in reference to their applicability to photometric detection at optical wavelengths. M.G.

N85-17910*# San Diego State Univ., Calif.
FILTER AND PASSBAND PROBLEMS
Andrew T. Young *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 217-221 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

Problems associated with achieving precision in photometric measurements of stars are examined. The thermal stabilization of glass and interference filters and the determination of correct analytic representations of bandwidth effects in data reduction are particularly discussed. Spectral sampling requirements are also addressed. M.G.

N85-17911*# Arizona Univ., Tucson.
LIGHT SCATTERED FROM POLISHED OPTICAL SURFACES: WINGS OF THE POINT SPREAD FUNCTION
C. E. KenKnight *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 222-242 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

Random figure errors from the polishing process plus particles on the main mirrors in a telescope cause an extended point spread function (PSF) declining approximately as the inverse square of the sine of the angle from a star from about 100 micro-rad to a right angle. The decline in at least one case, and probably in general, proceeds as the inverse cube at smaller angles where the usual focal plane aperture radius is chosen. The photometric error due to misalignment by one Airy ring spacing with an aperture of n rings depends on the net variance in the figure. It is approximately 60/(n+1)(3) when using the data of Kormendy (1973). A typical value is 6 x 10 to the -5th power per ring of misalignment with n = 100 rings. The encircled power may be modulated on a time scale of hours by parts per thousand in a wavelength dependent manner due to relative humidity effects on

mirror dust. The scattering according to an inverse power law is due to a random walk in aberration height caused by a multitude of facets and slope errors left by the polishing process. A deviation from such a law at grazing emergence may permit monitoring the dust effects. M.G.

N85-17756*# Wisconsin Univ., Madison.
EVIDENCE FOR NON-RADIATIVE ACTIVITY IN HOT STARS
J. P. Cassinelli *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 2-23 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03A

N85-17757*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
EVIDENCE FOR NON-RADIATIVE ACTIVITY IN STARS WITH T SUB eff > 10000 K
Jeffrey L. Linsky *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 24-46 refs (For primary document see N85-17755 08-88)
(Grants NAG5-82; NGL-06-003-057)
Avail: NTIS HC A12/MF A01 CSCL 03A

N85-17758*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
OBSERVATIONS OF NONTHERMAL RADIO EMISSION FROM EARLY-TYPE STARS
D. C. Abbott, J. H. Bieging (California Univ., Berkely), and E. Churchwell (Wisconson Univ., Madison) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 47-52 refs (For primary document see N85-17755 08-88)
(Grants NSF AST-82-18375; NSF AST-79-05578; NSF AST-81-14717)
Avail: NTIS HC A12/MF A01 CSCL 03A

N85-17759*# Lick Observatory, Santa Cruz, Calif.
NONRADIAL PULSATION AND MASS LOSS IN EARLY B STARS
G. Donald Penrod and Myron Smith (National Solar Observatory) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 53-56 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03A

N85-17761*# Waterloo Univ. (Ontario). Dept. of Physics.
LIGHT VARIATIONS OF THE B-TYPE STAR HD 160202
Gustav A. Bakos *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 62-65 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03A

N85-17766*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CORONAL TEMPERATURES
J. H. Swank *In its* The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 86-90 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03A

N85-17770*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
THEORY TESTED BY MEANS OF THE STARS
L. Golub *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 106-120 refs (For primary document see N85-17755 08-88)
(Grant NAGw-112)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17792*# California Univ., San Diego, La Jolla. Center for Astrophysics and Space Sciences.
BL LACERTAE OBJECTS: MULTIFREQUENCY OBSERVATIONS AND MODEL APPLICATIONS
Diane M. Worrall *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 11-13 refs (For primary document see N85-17790 08-88)
(Grant NAG5-63)
Avail: NTIS HC A13/MF A01 CSCL 03A

N85-17796# Padua Univ. (Italy). Inst. di Astronomia.
A NEW ESTIMATE OF THE LOCAL LUMINOSITY FUNCTION OF SEYFERT 1 NUCLEI
F. Z. Cheng (Center for Astrophysics, Hefei, China), L. Danese, G. DeZotti, and A. Franceschini *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 25-27 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17797# Technische Univ., Berlin (West Germany). Inst. fuer Astronomie und Astrophysik.
OPTICAL STUDIES OF X-RAY SELECTED ACTIVE GALACTIC NUCLEI (AGN) IN THE DIRECTION OF THE LARGE MAGELLANIC CLOUD (LMC)
Manfred W. Pakull *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 28-31 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17799# Institut d'Astrophysique, Paris (France).
THE ULTRAVIOLET SPECTRA OF THE NARROW LINE ACTIVE GALAXIES NGC 3081 AND NGC 4507
F. Durret and J. Bergeron *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 35-39 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17806# Byurakan Observatory (USSR).
A COMPARISON OF SOME PHOTOMETRIC PARAMETERS OF ACTIVE AND NORMAL SPIRAL GALAXIES
A. T. Kalloghlian *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 61-62 (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17807# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
X-RAY SURVEYS OF QUASARS WITH THE EINSTEIN OBSERVATORY
Tommaso Maccacaro *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 63-72 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17809# Mullard Space Science Lab., Dorking (England).
EXOSAT OBSERVATIONS OF ACTIVE GALACTIC NUCLEI
G. Branduardi-Raymont, S. J. Bell-Burnell (Royal Observatory, Edinburgh), B. Kellett, H. Fink (Max-Planck Inst. fuer Physik und Astrophysik, Garching, West Germany), D. Molteni (Palermo Univ., Italy), and I. McHardy (Leicester Univ., England) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 88-91 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17811# Institute of Space and Astronautical Science, Tokyo (Japan).
CHARACTERISTICS OF X-RAY SPECTRA FROM GALACTIC AND EXTRAGALACTIC X-RAY SOURCES
Masaru Matsuoka *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 96-98 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17814# Pennsylvania State Univ., University Park. Dept. of Astronomy.

X-RAY SPECTRA OF ACCRETION DISKS
P. Meszaros and W. Nagel (Max-Planck Institut fuer Physik und Astrophysik, Garching, West Germany) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 221-223 refs (For primary document see N85-17790 08-88)
(Grant NSF AST-83-13886)
Avail: NTIS HC A13/MF A01

N85-17815# Institute of Space and Astronautical Science, Tokyo (Japan).
THE X-RAY SPECTRA OF NGC 4151
M. Matsuoka and T. Ikegami *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 108-110 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17816# Technische Univ., Berlin (West Germany). Inst. fuer Astronomie und Astrophysik.
EXO 1102.8+2539, AN X-RAY VARIABLE ACTIVE GALACTIC NUCLEUS (AGN)
K. Beuermann, L. Stella (ESOC, Darmstadt, West Germany), and W. Sieber (Max-Planck Inst. fuer Radioastronomie) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 111-113 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17817# Naval Research Lab., Washington, D. C.
ONE TO EIGHT MONTH X-RAY LIGHT CURVES FOR ACTIVE EXTRAGALACTIC OBJECTS
W. A. Snyder and K. S. Wood *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 114-117 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17818# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
THE HIGH ENERGY X-RAY SPECTRUM OF 3C 273
M. Bezlar (Tuebingen Univ., West Germany), R. Staubert (Tuebingen Univ., West Germany), E. Kendziorra (Tuebingen Univ., West Germany), G. Hasinger, W. Pietsch, C. Reppin, J. Truemper, and W. Voges *In its* X-ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 118-120 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17819# Arizona Univ., Tucson. Steward Observatory.
UV AND X-RAY OBSERVATIONS OF AGN: TWO COMPARISONS WITH OTHER WAVE LENGTHS
Matthew A. Malkan *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 121-128 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17821*# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany).
THE X-RAY PROPERTIES OF HIGH-REDSHIFT, OPTICALLY SELECTED QSOS
Scott F. Anderson and Bruce Margon *In its* X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 132-134 refs (For primary document see N85-17790 08-88)
(Grant NAG8-433)
Avail: NTIS HC A13/MF A01

N85-17822# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
ON THE SURFACE DENSITY OF X-RAY SELECTED BL LACERTAE OBJECTS
Isabella M. Gioia, T. Maccacaro, D. Maccagni (CNR, Milan), and J. Stocke (Arizona Univ., Tucson) *In* Max-Planck Inst. fuer Physik und Astrophysik. X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 135-137 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17824# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany).
PHYSICAL PROCESSES IN RELATIVISTIC PLASMAS
Roland Svensson *In its* X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 152-163 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17838# Pennsylvania State Univ., University Park. Dept. of Astronomy.
X-RAY SPECTRA OF ACCRETION DISKS
P. Meszaros and W. Nagel (Max-Planck Institut fuer Physik und Astrophysik, Garching, West Germany) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 221-223 refs (For primary document see N85-17790 08-88)
(Grant NSF AST-83-13886)
Avail: NTIS HC A13/MF A01

N85-17839# Manchester Univ. (England). Dept. of Astronomy.
THEORETICAL STUDIES OF EMISSION LINE VARIABILITY IN TYPE 1 SEYFERT GALAXIES
A. Robinson *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 224-228 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17843# Max-Planck-Inst. fuer Extraterrestrische Physik, Garching (West Germany).
THE ROSAT ALL-SKY SURVEY IN X-RAYS
Joachim Truemper *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 254-260 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17844# Leicester Univ. (England). X-ray Astronomy Group.
THE ROSAT XUV WIDE FIELD CAMERA
J. P. Pye, A. Wells, R. Willingale, and K. A. Pounds *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 261-267 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17845# Hamburger Sternwarte (West Germany).
AN OBJECTIVE PRISM QUASAR SURVEY WITH THE SCHMIDT TELESCOPE ON CALAR ALTO (SPAIN)
Ulrich Haug *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 268-270 (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17846# Space Telescope Science Inst., Baltimore, Md.
ON THE UNIQUE CAPABILITIES OF THE HUBBLE SPACE TELESCOPE FOR STUDIES OF ROSAT DEEP-SURVEY X-RAY SOURCES
R. E. Griffiths *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 271-274 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17847# Max-Planck-Inst. fuer Radioastronomie, Bonn (West Germany).
VERY LONG BASE INTERFEROMETRY (VLBI) AND X-RAY OBSERVATIONS OF COMPLETE SAMPLES OF RADIO SELECTED ACTIVE GALACTIC NUCLEI
Peter Bierman and J. Anton Zensus *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 275-280 refs (For primary document

see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17912*# Optikos Corp., Saugus, Mass.
APPLICATION OF FIBER OPTICS AND COMPOUND COLLECTORS
Stephen D. Fantone *In* NASA. Ames Research Center Proc. of the Workshop on Improvements to Photometry Nov. 1984 p 243-253 refs (For primary document see N85-17892 08-89)
Avail: NTIS HC A12/MF A01 CSCL 03A

The utilization of fiber optics and compound flux collectors as optical components in stellar photometers is discussed. Basic principles are outlined for such components and systems issues are addressed. Author

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N85-17913*# Citadel Coll., Charleston, S.C. Dept. of Physics.
ELEMENTAL ABUNDANCES OF MERCURY-MANGANESE STARS AND THE POPULATION 2 TYPE STAR HD 109995 Semiannual Report, 1 Jul. 1984 - 31 Jul. 1985
Saul J. Adelman 1 Feb. 1985 6 p refs
(Grant NAG5-218)
(NASA-CR-174298; NAS 1.26:174298) Avail: NTIS HC A02/MF A01 CSCL 03B

Ultraviolet and optical data for the Hg Mn stars Coronae Borealis and Cancri is being combined with data for the field horizontal branch population II star HD 109995 in order to derive the element abundances in their photospheres. Data collected by IUE is being utilized. R.S.F.

N85-17914*# California Inst. of Tech., Pasadena. Seismological Lab.
IMPACT AND COLLISIONAL PROCESSES IN THE SOLAR SYSTEM Semiannual Report
Thomas J. Ahrens 29 Jan. 1985 4 p refs
(Grant NGL-05-002-105)
(NASA-CR-174297; NAS 1.26:174297) Avail: NTIS HC A02/MF A01 CSCL 03C

The mechanical and thermodynamic aspects of shock impact cratering and accretionary processes on solid planets and satellites are being investigated experimentally. The recently proposed model of Melosh, describing the physics controlling the size and velocity of only lightly shocked spalled ejecta surrounding the crushed rock region of an impact crater, was studied at the Ames gun facility. Spall velocity measurements using lead and aluminum bullets were conducted. In addition, shock temperatures of silicates and volatile-bearing minerals were measured using radiative techniques. Finally impact devolatilization of minerals and accretion of planetary atmospheres were examined. Measurements of the release isentropes of CaCO3 were carried out. The effect on the water budgets of planets of reactions which occur when metallic iron (which would be present in chondritic material) is introduced into a simple accretion model is under investigation. R.S.F.

N85-17915*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
SPECTROSCOPIC OBSERVATIONS OF SELECTED STELLAR SYSTEMS Final Report
P. S. Conti and C. D. Garmany [1985] 12 p
(Grant NAG5-78)
(NASA-CR-174288; NAS 1.26:174288) Avail: NTIS HC A02/MF A01 CSCL 03B

Spectra of very luminous, high temperature stars, the o-type stars with the largest masses among stars, and the Wolf-Rayet (W-R) stars are studied. These stars are characterized by strong stellar winds which produce signiicant mass loss. The nature and evolution of these winds are studied to learn the densities, velocity structue, ionization balance, and composition. The IUE satellite provides the best way to study these phenomena because many of the most important ground state and excited state lines of common highly ionized species are found in the spectral range. B.G.

N85-17760*# Computer Sciences Corp., Falls Church, Va.
NARROW ABSORPTION COMPONENTS IN Be STAR WINDS
C. A. Grady *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 57-61 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03C

N85-17762*# Space Telescope Science Inst., Baltimore, Md.
ULTRAVIOLET SPECTRAL MORPHOLOGY OF O-TYPE STELLAR WINDS
Nolan R. Walborn *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 66-69 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03C

N85-17767*# Universidad Nacional Autonoma de Mexico, Mexico City. Inst. de Astronomia.
BIPOLAR EJECTION OF MATTER FROM HOT STARS
Paris Pismis *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 91-100 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17768*# Applied Research Corp., Landover, Md.
STELLAR WINDA: OBSERVATIONAL EVIDENCE FOR A HOT-COOL STAR CONNECTION
Wayne L. Waldron *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 95-100 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01

N85-17771*# Heidelberg Univ. (West Germany). Inst. fuer Theoretische Astrophysik.
THE SCALING OF CORONAL MODELS FROM ONE STAR TO ANOTHER
R. Hammer *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 121-124 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17773*# Delaware Univ., Newark.
COROTATING INTERACTION REGIONS IN STELLAR WINDS: PARTICLE ACCELERATION AND NON-THERMAL RADIO EMISSION IN HOT STARS
D. J. Mullan *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 130-135 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01

N85-17774*# Space Telescope Science Inst., Baltimore, Md.
SYNCHROTRON EMISSION FROM CHAOTIC STELLAR WINDS
Richard L. White *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 136-140 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17775*# National Center for Atmospheric Research, Boulder, Colo. High Altitude Observatory.
WINDS FROM ROTATING, MAGNETIC, HOT STARS
David B. Friend *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 142-147 refs Sponsored by NSF (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17776*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DEPARTURES FROM LTE POPULATIONS VERSUS ANOMALOUS ABUNDANCES: THE EFFECTS OF HEATING
Anne B. Underhill *In its* The Origin of Nonradiative Heating/ Momentum in Hot Stars Jan. 1985 p 148-158 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17777*# Applied Research Corp., Landover, Md.
IS THE RATIO OF OBSERVED X-RAY LUMINOSITY TO BOLOMETRIC LUMINOSITY IN EARLY-TYPE STARS REALLY A CONSTANT?
Wayne L. Waldron *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 159-163 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17778*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NON-RADIATIVE ENERGY FROM DIFFERENTIAL ROTATION IN HOT STARS
Kwing L. Chan (Applied Research Corp., Landover, Md.), H. G. Mayr, and I. Harris *In its* The Origin of Nonradiative Heating/ Momentum in Hot Stars Jan. 1985 p 164-168 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17780*# Calgary Univ. (Alberta). Dept. of Physics.
NONRADIATIVE HEATING AND ENHANCED MASS-LOSS DUE TO SHEAR TURBULENCE IN MASSIVE HOT STARS
S. R. Sreenivasan and W. J. F. Wilson *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/ Momentum in Hot Stars Jan. 1985 p 177-182 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17781*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A LEAKY WAVEGUIDE MODEL FOR MHD WAVE DRIVEN WINDS FROM CORONAL HOLES
Joseph M. Davila *In its* The Origin of Nonradiative Heating/ Momentum in Hot Stars Jan. 1985 p 183-187 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17782*# Sterrewacht Sonnenborgh, Utrecht (Netherlands).
RADIATIVELY DRIVEN WINDS AND WHAT THEY IMPLY: A REVIEW OF RADIATIVE DRIVEN INSTABILITIES AND THEIR IMPORTANCE IN HOT STARS
A. G. Hearn *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 188-198 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17783*# Tokyo Astronomical Observatory (Japan).
MAGNETIC EFFECTS IN THE HEATING AND MODIFICATION OF FLOWS IN THE OUTER STELLAR ATMOSPHERES WITH APPLICATION TO EARLY TYPE STAR CASE
Yutaka Uchida *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 199-220 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17784*# California Univ., San Diego, La Jolla.
EFFECT OF SCATTERING ON INSTABILITIES IN LINE-DRIVEN STELLAR WINDS
S. P. Owocki and G. B. Rybicki (Harvard Center for Astrophysics, Cambridge, Mass.) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 221-225 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17785*# Astronomical Inst., Utrecht (Netherlands).
NEW INSTABILITIES IN LINE DRIVEN WINDS
P. C. H. Martens *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 226-232 (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17786*# Heidelberg Univ. (West Germany).
RADIATIVE AMPLIFICATION OF ACOUSTIC WAVES IN HOT STARS
B. E. Wolf *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 233-235 (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17787*# Observatoire de Paris-Meudon (France). Dept. Recherches Spatiales.
ON THE ROLE PLAYED BY LINES IN RADIATIVELY DRIVEN STELLAR WINDS DEPENDING ON THE POSITION OF THE STARS IN THE HR DIAGRAM
Marie Christine Migozzi and Jean-Pierre J. Lafon *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/ Momentum in Hot Stars Jan. 1985 p 236-240 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17788*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
MULTILINE TRANSFER AND THE DYNAMICS OF STELLAR WINDS Abstract Only
David C. Abbott and L. B. Lucy (Columbia Univ., New York) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 241 Submitted for publication (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17789*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SUMMARY OF THE ORIGIN OF NONRADIATIVE HEATING/ MOMENTUM IN HOT STARS
Anne B. Underhill *In its* The Origin of Nonradiative Heating/ Momentum in Hot Stars Jan. 1985 p 243-254 (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17794# Mullard Radio Astronomy Observatory, Cambridge (England).
THE RELATIONSHIP BETWEEN RADIO STRUCTURES AND STELLAR DYNAMICS OF NEARBY ELLIPTICAL GALAXIES
M. Birkinshaw and R. L. Davies (Kitt Peak National Observatory, Tucson) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 18-20 refs Sponsored by UK Science and Engineering Research Council and Gonville and Caius College (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17795# Tel-Aviv Univ. (Israel). Wise Observatory.
ACTIVE INNER REGIONS OF ISOLATED GALAXIES
N. Brosch *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 21-24 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17798# Ruhr Univ., Bochum (West Germany). Inst. fuer Astronomische.
CONTINUOUS TRANSITION FROM STAR BURST GALAXIES TO SEYFERT GALAXIES
Gerhard F. O. Schnur (Centro Hispano-Aleman), Th. Schmidt-Kaler, and J. V. Feitzinger *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 32-34 refs Sponsored by Deutsche Forschungsgemeinschaft (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17823# Cambridge Univ. (England). Inst. of Astronomy.
COMMENTS ON THE PHYSICS OF ACTIVE GALACTIC NUCLEI
Martin J. Rees *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 138-151 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17825# Milan Univ. (Italy). Dept. di Fisica.
ON THE BROADBAND ENERGY SPECTRA OF QUASARS AND BL LAC OBJECTS
L. Maraschi *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 164-176 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17828*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. Lab. for High Energy Astrophysics.
SHOCK ACCELERATION IN ACTIVE GALACTIC NUCLEI AND QUASARS
Demosthenes Kazanas and Donald C. Ellison (Maryland Univ., College Park) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 185-187 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01 CSCL 03A

N85-17831# Padua Univ. (Italy). Ist. di Astronomia.
ON THE HYDRODYNAMICAL EQUATIONS OF ASTROPHYSICAL JETS
M. Calvani, L. Nobili, and R. Turolla (International School for Advanced Studies) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 197-199 ref (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17832# Turin Univ. (Italy). Ist. di Fisica Generale.
COLLIMATED WINDS FROM ACTIVE GALACTIC NUCLEI
A. Ferrari, R. Rosner (Harvard-Smithsonian Center for Astrophysics), E. Trussoni, and K. Tsinganos (Harvard-Smithsonian Center for Astrophysics) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 200-202 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17833# Oxford Univ. (England). Dept. of Astrophysics.
AN ALTERNATIVE TO RELATIVISTIC BEAMING IN AGN
C. S. Coleman *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 203-205 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17834# Catania Univ. (Italy). Ist. di Astronomia.
MODELS OF NONKEPLERIAN ACCRETION DISKS BASED ON DYNAMO MAGNETIC FIELD: APPLICATION TO ACTIVE GALACTIC NUCLEI (AGN)
G. Belvedere, D. Molteni (Palermo Univ., Italy), and R. M. Pidatella (Kiepenheuer Inst.) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 206-210 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17835# Zurich Univ. (Switzerland). Inst. fuer Theoretische Physik.
CENTRIFUGALLY DRIVEN MAGNETOHYDRODYNAMIC (MHD) WINDS AND THE NONTHERMAL EMISSION REGIONS IN ACTIVE GALACTIC NUCLEI (AGN)
M. Camenzind and T. J.-L. Courvoisier (European Southern Observatory, Munich) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 212-214 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17836# European Southern Observatory, Garching (West Germany). Space Telescope European Coordinating Facility.
MACROSCOPIC CURRENTS AND WIND PERTURBATIONS IN THE FRAME OF THE WIND AND SHOCK MODEL
T. J.-L. Courvoisier and M. Camenzind (Zurich Univ.) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 215-217 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17837# Leicester Univ. (England). Dept. of Astronomy.
DUELLING WINDS: A MODEL FOR BROAD-LINE REGIONS
Michael D. Smith and Derek J. Raine *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 218-220 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17840# Kentucky Univ., Lexington. Dept. of Physics and Astronomy.
ON THE STABILITY OF BROAD LINE CLOUDS IN ACTIVE GALACTIC NUCLEI
Moshe Elitzur and Gary Ferland *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 229-231 refs (For primary document see N85-17790 08-88)
(Grants NSF AST-83-04895; NSF AST-83-05094)
Avail: NTIS HC A13/MF A01

N85-17842# European Southern Observatory, Garching (West Germany).
ACTIVE GALACTIC NUCLEI AND THEIR COSMOLOGICAL EVOLUTION
G. Setti *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 243-253 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17868*# Chicago Univ., Ill. Dept. of Physics.
STAR FORMATION IN GLOBULES
J. A. Davidson *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 186-193 refs (For primary document see N85-17848 08-89)
(Grant NsG-2057; NSF AST-81-17134)
Avail: NTIS HC A17/MF A01 CSCL 03C

N85-17870*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CIRCUMSTELLAR DUST DISKS AROUND YOUNG STARS
Martin Cohen, Richard Schwartz (Missouri Univ., St. Louis), Paul M. Harvey (Texas Univ., Austin), and Bruce A. Wilking (Texas Univ., Austin) *In its* Airborne Astron. Symp. Dec. 1984 p 199-203 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03C

N85-17871*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CARBON STARS: THERE IS NO SUCH THING AS A DEAD LEG
J. H. Goebel *In its* Airborne Astron. Symp. Dec. 1984 p 204-223 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

N85-17874*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INTERSTELLAR GRAIN MANTLES
A. Tielens, F. Witteborn, J. Goebel, J. Bregman, L. Allamandola, and L. B. dHendecourt (Leiden Univ.) *In its* Airborne Astron. Symp. Dec. 1984 p 240-246 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

N85-17876*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FAR INFRARED CONTINUUM EMISSION FROM THE GALACTIC CENTER
Michael W. Werner, Eric Becklin (Hawaii Univ.), and Ian Gatley (United Kingdom Infrared Telescope Unit) *In its* Airborne Astron. Symp. Dec. 1984 p 255-259 refs (For primary document see

N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

N85-17878*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VARIATION OF OXYGEN AND NITROGEN ABUNDANCES IN THE GALAXY
H. Dinerstein (Texas Univ., Austin), D. Lester (Texas Univ., Austin), M. W. Werner, D. M. Watson (California Inst. of Tech.), R. L. Genzel (California Univ., Berkeley), and R. H. Rubin *In its* Airborne Astron. Symp. Dec. 1984 p 266-271 refs (For primary document see N85-17848 08-89)
(Contract NCA2-OR781-201)
Avail: NTIS HC A17/MF A01 CSCL 03B

N85-17880*# Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
DUST RERADIATION FROM NGC 6946
J. Smith, D. A. Harper, and R. F. Loewenstein *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 277-286 refs (For primary document see N85-17848 08-89)
(Grants NGR-14-001-227; NAG2-252)
Avail: NTIS HC A17/MF A01 CSCL 03B

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N85-17916*# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
EXTENDED ATMOSPHERES OF OUTER PLANET SATELLITES AND COMETS Interim Report, Aug. - Oct. 1984
William H. Smyth and Michael R. Combi Dec. 1984 7 p refs
(Contract NASw-3966)
(NASA-CR-174338; NAS 1.26:174338) Avail: NTIS HC A02/MF A01 CSCL 03B

The cometary hydrogen particle-trajectory model was used successfully to analyze observations of Comet P/Encke. The Pioneer Venus Orbiter Ultraviolet Spectrometer observed the comet at 1216A (hydrogen Lyman-alpha) on 15 April 1984, when the comet was .58 AU from the Sun and 1.02 AU from Venus. The analysis implies a production rate at .58 AU of 3.3 x 10 to the 28th power/sec of the water molecules which photodissociate to produce the observed hydrogen. M.G.

N85-17917*# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
ANALYSIS OF JOVIAN DECAMETRIC DATA: STUDY OF RADIO EMISSION MECHANISMS Progress Report, 15 Sep. 1982 - 15 Sep. 1984
David H. Staelin, Tomas A. Arias, Peter M. Garnavich, and Philip W. Rosenkranz 8 Jan. 1985 13 p refs
(Grant NAGw-373)
(NASA-CR-174206; NAS 1.26:174206) Avail: NTIS HC A02/MF A01 CSCL 03B

The Voyager 1 and Voyager 2 Planetary Radio Astronomy Experiments (PRA) have produced the finest set of Jovian decametric radio emission data ever obtained. Jovian decametric L-burst and S-burst arcs were characterized and the data reconciled with models for the radio emission geometry and mechanisms. The first major results involve comparisons of the distribution of arc separations with longitudes. The identification and analyses of systematic variations in the PRA data have yielded interesting results, but only the most obvious features of the data were examined. Analyses of the PRA data were extended with the use of new 6-Sec formats that are more sensitive to the S-bursts. B.G.

N85-17918*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
MINERALOGICAL INVESTIGATIONS OF LUNAR SAMPLES AND METEORITES Semiannual Progress Report, 1 Feb. 1984 - 31 Jan. 1985
Ursula B. Marvin Feb. 1985 5 p
(Grant NAG9-29)
(NASA-CR-174291; NAS 1.26:174291; SAPR-3; SAPR-4) Avail: NTIS HC A02/MF A01 CSCL 03B

Electron microprobe analysis was employed to study north ray crater breccia 67015 from the Moon. The melting history of lunar troctolite 130-9 was investigated, along with the presence of Mg-26 in anorthite grains recovered from the Vaca Meurta mesosiderite. Geographic distributions of meteorites in Antarctica were plotted. The Allende meteorite was analyzed with the electron microprobe method. R.S.F.

N85-17919*# Woods Hole Oceanographic Institution, Mass.
GRAVITY ANOMALY MAP OF MARS AND MOON AND ANALYSIS OF VENUS GRAVITY FIELD: NEW ANALYSIS PROCEDURES Final Report
[1984] 47 p refs
(Contract NASw-3770)
(NASA-CR-174295; NAS 1.26:174295) Avail: NTIS HC A03/MF A01 CSCL 03B

The technique of harmonic splines allows direct estimation of a complete planetary gravity field (geoid, gravity, and gravity gradients) everywhere over the planet's surface. Harmonic spline results of Venus are presented as a series of maps at spacecraft and constant altitudes. Global (except for polar regions) and local relations of gravity to topography are described. R.S.F.

N85-17920*# Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE DISCOVERY CIRCUMSTANCES OF EARTH-APPROACHING ASTEROIDS
L. G. Taff and M. S. Randall [1983] 34 p refs
(Grant NAGw-232)
(NASA-CR-174327; NAS 1.26:174327) Avail: NTIS HC A03/MF A01 CSCL 03B

The discovery circumstances are analyzed for all Earth-approaching asteroids detected in the last twenty-four years. In particular, topocentric angular velocities, opposition distance, geocentric and heliocentric distances, phase angle, and lunar phase at discover were calculated in an effort to separate any selection effects between chance and purposeful (i.e., as the result of a systematic search) discoveries. Another motivation was the possibility of discerning useful clues how to search more efficiently for such objects. There are 60 minor planets in the sample. The principal result is that the discovery of Earth-approaching asteroids is dominated by serendipity. Therefore, searching for them at the current relatively bright limits at less than a very high rate seems pointless. Author

N85-17853*# Maryland Univ., College Park.
AIRBORNE OBSERVATIONS OF COMETS
Humberto Campins *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 63-68 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

N85-17854*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MEASUREMENTS OF H2O IN JUPITER'S ATMOSPHERE FROM 5 MICRONS AIRBORNE OBSERVATIONS
Gordon L. Bjoraker (Arizona Univ.), Harold P. Larson (Arizona Univ.), Uwe Fink (Arizona Univ.), and Virgil G. Kunde *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 69-75 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

N85-17855*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DETECTION OF THE J-10 MAINFOLD OF THE PURE

ROTATIONAL BAND OF PHOSPHINE ON SATURN
M. R. Haas (Mycol, Inc.), E. F. Erickson, D. Goorvitch, D. D. McKibbin, and D. M. Rank (California Univ., Santa Cruz) *In its* Airborne Astron. Symp. Dec. 1984 p 76-80 (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03B

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N85-17921*# Hawaii Univ., Honolulu. Institute for Astronomy.
CORONAL AND CHROMOSPHERIC PHYSICS Semiannual Status Report, 1 May - 31 Oct. 1984
Donald N. B. Hall, Donald A. Landman, and Frank Q. Orrall 31 Oct. 1984 7 p
(Grant NGL-12-001-011)
(NASA-CR-174290; NAS 1.26:174290) Avail: NTIS HC A02/MF A01 CSCL 03B

The Solar Maximum Mission support program is mentioned along with investigations of the solar corona, prominences, and chromosphere. The solar limb was studied using far infrared and submillimeter photometry. Stokes profiles obtained from sunspot observations were examined with a polarimetric technique. R.S.F.

N85-17922*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
THE CALCULATION OF THEORETICAL CHROMOSPHERIC MODELS AND THE INTERPRETATION OF SOLAR SPECTRA FROM ROCKETS AND SPACECRAFT Semiannual Report, 1 Jan. - 31 Dec. 1984
Eugene H. Avrett Jan. 1985 74 p refs
(Grant NsG-7054)
(NASA-CR-174289; NAS 1.26:174289; SAR-18; SAR-19) Avail: NTIS HC A04/MF A01 CSCL 03B

Solar chromospheric models are described. The models included are based on the observed spectrum, and on the assumption of hydrostatic equilibrium. The calculations depend on realistic solutions of the radiative transfer and statistical equilibrium equations for optically thick lines and continua, and on including the effects of large numbers of lines throughout the spectrum. Although spectroheliograms show that the structure of the chromosphere is highly complex, one-dimensional models of particular features are reasonably successful in matching observed spectra. Such models were applied to the interpretation of chromospheric observations. B.G.

N85-17923*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TEMPORAL AND SPECTRAL CHARACTERISTICS OF SOLAR FLARE HARD X-RAY EMISSION
Brian R. Dennis, Alan L. Kiplinger, Larry E. Orwig, and Kenneth J. Frost Jan. 1985 27 p refs Presented at 2nd Indo-US Workshop on Solar Terrest. Phys., New Delhi, 20 Jan. - 3 Feb. 1984
(NASA-TM-86187; NAS 1.15:86187) Avail: NTIS HC A03/MF A01 CSCL 03B

Solar Maximum Mission observations of three flares that impose stringent constraints on physical models of the hard X-ray production during the impulsive phase are presented. Hard X-ray imaging observations of the flares on 1980 November 5 at 22:33 UT show two patches in the 16 to 30 keV images that are separated by 70,000 km and that brighten simultaneously to within 5 s. Observations to O V from one of the footprints show simultaneity of the brightening in this transition zone line and in the total hard X-ray flux to within a second or two. These results suggest but do not require the existence of electron beams in this flare. The rapid fluctuations of the hard X-ray flux within some flares on the time scales of > 1 s also provide evidence for electron beams and limits on the time scale of the energy release mechanism. Observations of a flare on 1980 June 6 at 22:34 UT show variations in the > 28 keV X-ray counting rate from one 20 ms interval to the next over a period of 10 s. The hard X-ray spectral variations measured with 128 ms time resolution for one 0.5 s spike during this flare are consistent with the predictions of thick-target non-thermal beam model. M.G.

N85-17924*# Stanford Univ., Calif. Center for Space Science and Astrophysics.
ENERGY RELEASE IN SOLAR FLARES
P. A. Sturrock, P. Kaufmann, R. L. Moore, and D. F. Smith 1984 35 p
(Grants NGL-05-020-272; NAGw-92; Contract N00014-75-C-0673) (NASA-CR-174302; NAS 1.26:174302; AD-A148097) Avail: NTIS HC A03/MF A01 CSCL 03B

This document presents observational evidence concerning energy release in solar flares. It is proposed that a different process may be operative on four different time scales: (1) on the sub-second time scale of sub-bursts which are a prominent feature of mm-wave microwave records; (2) on the few-seconds time scale of elementary bursts which are a prominent feature of hard X-ray records; (3) on the few-minutes time scale of the impulsive phase; and (4) on the tens-of-minutes or longer time scale of the gradual phase. It is proposed that the concentration of magnetic field into magnetic knots at the photosphere has important consequences for the coronal magnetic-field structure such that the magnetic field in this region may be viewed as an array of elementary flux tubes. The release of the free energy of one such tube may produce an elementary burst. The development of magnetic islands during this process may be responsible for the sub-bursts. The impulsive phase may be simply the composite effect of many elementary bursts. It is also proposed that the gradual phase of energy release, with which flares typically begin and with which many flares end, involves a steady process of reconnection, whereas the impulsive phase involves a more rapid stochastic process of reconnection which is a consequence of mode interaction. In the case of two-ribbon flares, the late part of the gradual phase may be attributed to reconnection of a large current sheet which is being produced as a result of filament eruption. A similar process may be operative in smaller flares.
Author (GRA)

N85-17765*# Observatoire de Paris-Meudon (France).
ACTIVE PHENOMENA IN THE PRE-MAIN SEQUENCE STAR AB AUR
F. Praderie, T. Simon (Hawaii Univ.), A. M. Boesgaard (Hawaii Univ.), P. Felenbok, C. Catala, J. Czarny, and A. Talavera (ESA. ESA Tracking Station, Madrid) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 81-85 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17769*# Florence Univ. (Italy). Inst. de Astronomia.
HEATING IN THE SOLAR MANTLE
Claudio Chiuderi *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 101-105 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17772*# Heidelberg Univ. (West Germany). Inst. fuer Theoretische Astrophysik.
OVERHEATED OPEN CORONAL REGIONS
R. Hammer *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 125-129 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N85-17925*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CURRENT CARRIERS FOR THE FIELD-ALIGNED CURRENT SYSTEM
R. A. Hoffman, M. Sugiura, and N. C. Maynard Sep. 1984 21 p refs Presented at the 25th Plenary Meeting of the Committee on Space Research at the Symp. on the Phys. of the Magnetosphere-Ionosphere Connection, Graz, Jul. 1984
(NASA-TM-86161; NAS 1.15:86161) Avail: NTIS HC A02/MF A01 CSCL 03B

The Dynamics Explorer satellites have returned a large body of data containing high resolution magnetometer measurements and distributions of charged particles of all but thermal electrons. From these data the relations of the field aligned currents to particle precipitation structures were investigated and the charge carriers were identified. Results include the following: (1) during very quiet periods, field aligned currents exist primarily as fine structure; (2) during onset of substorms, region 1 and region 2 become clearly evident but contain significant structure; (3) as magnetic activity subsides, current regions become less distinct, and structure becomes more dominant; (4) the distribution of the upward currents derived from magnetometer data and calculated from suprathermal electron data agree remarkably well in shape but not necessarily in magnitude; (5) at all local times, $>$ 5 eV electrons seldom carry most of the upward current; (6) except for the accelerated inverted-V electrons, the dominant upward current carriers which are measured are below 500 eV and are distributed in energy; (7) dusk upward currents (region 1) are associated with the boundary plasma sheet; and (8) suprathermal electron bursts are important current carrying structures. R.S.F.

N85-17926*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SU(2) X U(1) VACUUM AND THE CENTAURO EVENTS
D. Kazanas (Maryland Univ., College Park), V. K. Balasubrahmanyan, and R. E. Streitmatter Apr. 1984 15 p refs Submitted for publication
(NASA-TM-86082; NAS 1.15:86082) Avail: NTIS HC A02/MF A01 CSCL 03B

It is proposed that the fireballs invoked to explain the Centauro events are bubbles of a metastable superdense state of nuclear matter, created in high energy (E is approximately 10 to the 15th power eV) cosmic ray collisions at the top of the atmosphere. If these bubbles are created with a Lorentz factor gamma approximately = 10 at their CM frame, the objections against the origin of these events in cosmic ray interactions are overcome. Assuming further, that the Centauro events are to the explosive decay of these metastable bubbles, a relationship between their lifetime, tau, and the threshold energy for bubble formation, E sub th, is derived. The minimum lifetime consistent with such an interpretation in tau is approximately 10 to the -8th power sec, while the E sub th appears to be insensitive to the value of tau and always close to E sub th is approximately 10 to the 15th power eV. Finally it is speculated that if the available CM energy is thermalized in such collisions, these bubbles might be manifestations of excitations of the SU(2) x U(1) false vacuum. The absence of neutral pions in the Centauro events is then explained by the decay of these excitations. M.G.

N85-17763*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
NONTHERMAL RADIO EMISSION AND THE HR DIAGRAM
D. M. Gibson (New Mexico Inst. of Mining and Technology) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 70-74 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17764*# Pennsylvania State Univ., University Park. Dept. of Astronomy.
X-RAY ACTIVITY IN PRE-MAIN SEQUENCE STARS
Eric D. Feigelson *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 75-80 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03C

N85-17779*# Tokyo Astronomical Observatory (Japan).
BIPOLAR FLOWS AND X-RAY EMISSION FROM YOUNG STELLAR OBJECT
Yutaka Uchida and Kazunari Shibata (Aichi Univ. of Education, Japan) *In* NASA. Goddard Space Flight Center The Origin of Nonradiative Heating/Momentum in Hot Stars Jan. 1985 p 169-176 refs (For primary document see N85-17755 08-88)
Avail: NTIS HC A12/MF A01 CSCL 03B

N85-17791# European Southern Observatory, Garching (West Germany).
OPTICAL AND UV EMISSION OF ACTIVE GALACTIC NUCLEI
M. H. Ulrich *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 1-10 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17793# Nuffield Radio Astronomy Labs., Jodrell Bank (England).
RADIO SEYFERTS AND THE FORBIDDEN LINE REGION
A. Pedlar and J. E. Dyson *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 14-17 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17800# Observatoire de Paris-Meudon (France).
PRELIMINARY RESULTS ON THE ULTRAVIOLET OBSERVATIONS OF A COMPLETE X-RAY SELECTED SAMPLE OF ACTIVE GALACTIC NUCLEI (AGN)
C. Boisson *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 40-42 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17801# Institut d'Astrophysique, Paris (France).
LOW EXCITATION ABSORPTIONS IN THE SPECTRUM OF THE QUASAR PKS 1327-206 DUE TO THE GALAXY MCG 03-34-085
D. Kunth and J. Bergeron *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 43-46 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17802*# Washington Univ., Seattle. Dept. of Astronomy.
THE EXTRAGALACTIC NATURE OF H0323+022
Bruce Margon and George H. Jacoby (Kitt Peak National Observatory, Tucson) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 47-50 refs (For primary document see N85-17790 08-88)
(Grants NAG8-433; NSF ATS-78-09228)
Avail: NTIS HC A13/MF A01 CSCL 03A

N85-17803# Max-Planck-Inst. fuer Astronomie, Heidelberg (West Germany).
MORPHOLOGY AND OPTICAL POLARIZATION OF THE 3C 273 JET
K. Meisenheimer and H.-J. Roeser *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 51-54 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17804# Ruhr Univ., Bochum (West Germany). Inst. fuer Astronomische.

SPATIALLY RESOLVED OPTICAL SPECTROSCOPY OF THE RADIO JET OF THE X-RAY GALAXY NGC 2110
Gerhard F. O. Schnur (Centro Astronomico Hispano-Aleman), J. V. Feitzinger, and Th. Schmidt-Kaler *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 55-57 refs Sponsored by Deutsche Forschungsgemeinschaft (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17805# Bonn Univ. (West Germany). Inst. fuer Astrophysik.
EXTRAGALACTIC COSMIC RAYS FROM ACTIVE GALAXIES
Maurice M. Shapiro and Rein Silberberg (Hulbert Center for Space Research) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 58-60 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17808*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
X-RAY EMISSION FROM ACTIVE GALACTIC NUCLEI
Richard Mushotzky *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 73-87 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01 CSCL 03A

N85-17810# Consiglio Nazionale delle Ricerche, Milan (Italy). Ist. di Fisica Cosmica e Tecnologie Relative.
SOFT X-RAY EMISSION FROM BL LAC OBJECTS
D. Maccagni, L. Chiappetti (ESA, Darmstadt, West Germany), B. Garilli, P. Giommi (ESA, Darmstadt, West Germany), D. Molteni, M. Morini, and A. Rampini *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 92-95 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17812# Nagoya Univ. (Japan). Dept. of Astrophysics.
X-RAY EMISSION FROM PKS 2155-304
Hideyo Kunieda *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 99-101 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17813# Los Alamos Scientific Lab., N. Mex.
X-RAY EMISSION FROM CENTAURUS A
James Terrell *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 102-104 refs Sponsored by US Department of Energy (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17820# California Univ., San Diego. Center for Astrophysics and Space Sciences.
THE HEAO-1 DIFFUSE COMPONENT SPECTRUM FROM 15 TO ABOVE 500 keV
D. E. Gruber, R. E. Rothschild, J. L. Matteson, and R. L. Kinzer (NRL) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 129-134 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17826*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A UNIVERSAL SPECTRUM FOR AGNs AND QSOs
Demosthenes Kazanas *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 177-180 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01 CSCL 03A

N85-17827# Rome Univ. (Italy). Ist. Astronomico.
AN INVERSE COMPTON MODEL OF THE X-RAY EMISSION IN SEYFERT GALAXIES
G. C. Perola and L. Piro *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 181-184 refs Sponsored by CNR and Italian Ministry of Education (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17829*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
POWER LAW X- AND GAMMA-RAY EMISSION FROM RELATIVISTIC THERMAL PLASMAS
Andrzez A. Zdziarski *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 188-192 refs (For primary document see N85-17790 08-88)
(Grant NAGW-246)
Avail: NTIS HC A13/MF A01 CSCL 03A

N85-17830# Cambridge Univ. (England). Inst. of Astronomy.
PAIR PRODUCTION AT MODERATE OPTICAL DEPTHS
Susan Stepney and P. W. Guilbert (Max-Planck Institut fuer Extraterrestrische Physik, Garching, West Germany) *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 193-196 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17841# Cambridge Univ. (England). Inst. of Astronomy.
THE ORIGIN OF THE X-RAY BACKGROUND
A. C. Fabian *In* Max-Planck Inst. fuer Physik und Astrophysik X-Ray and UV Emission from Active Galactic Nuclei Oct. 1984 p 232-242 refs (For primary document see N85-17790 08-88)
Avail: NTIS HC A13/MF A01

N85-17881*# Naval Research Lab., Washington, D. C.
STARBURSTS IN GALAXIES: IMPLICATIONS OF MOLECULAR AND FAR-INFRARED OBSERVATIONS
L. J. Rickard, P. M. Harvey (Texas Univ.), and L. Blitz (Maryland Univ.) *In* NASA. Ames Research Center Airborne Astron. Symp. Dec. 1984 p 287-291 refs (For primary document see N85-17848 08-89)
Avail: NTIS HC A17/MF A01 CSCL 03C

99 GENERAL

N85-17927*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
CHRONOLOGY OF KSC AND KSC RELATED EVENTS FOR 1983
Ken Nail, Jr., comp. (New World Services, Inc.) 1 Oct. 1984 118 p
(NASA-TM-87400; KSC-KHR-8; NAS 1.15:87400) Avail: NTIS HC A06/MF A01 CSCL 05D

Materials for this chronology were selected from Aviation Week and Space Technology, Defense Daily, Miami Herald, Sentinel Star (Orlando), Today (Cocoa), Spaceport News (KSC), NASA News Releases, and other sources. The document is intended to serve as a record of KSC events and as a reference source for historians and other researchers. Arrangement is by month; items are by date of the published sources. Actual date of the event may be indicated in parenthesis, when the article itself does not make that information explicit. B.G.

N85-17928*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
[RESEARCH AND TECHNOLOGY HIGHLIGHTS OF THE LEWIS RESEARCH CENTER] Annual Report, 1984
1984 52 p

(NASA-TM-86899; NAS 1.15:86899) Avail: NTIS HC A04/MF A01 CSCL 05A

Highlights of research accomplishments of the Lewis Research Center for fiscal year 1984 are presented. The report is divided into four major sections covering aeronautics, space communications, space technology, and materials and structures. Six articles on energy are included in the space technology section. B.W.

N85-17929*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

RESEARCH AND TECHNOLOGY, LYNDON B. JOHNSON SPACE CENTER Annual Report

Nov. 1984 77 p

(NASA-TM-58263; S-540; NAS 1.15:58263) Avail: NTIS HC A05/MF A01 CSCL 05B

Johnson Space Center accomplishments in new and advanced concepts during 1984 are highlighted. Included are research funded by the Office of Aeronautics and Space Technology; Advanced Programs tasks funded by the Office of Space Flight; and Solar System Exploration and Life Sciences research funded by the Office of Space Sciences and Applications. Summary sections describing the role of the Johnson Space Center in each program are followed by one page descriptions of significant projects. Descriptions are suitable for external consumption, free of technical jargon, and illustrated to increase ease of comprehension. Author

N85-17930# Office of Naval Research Liason Office, Far East, APO, San Francisco, Calif.

ONR (OFFICE OF NAVAL RESEARCH) FAR EAST SCIENTIFIC BULLETIN, VOLUME 9, NUMBER 3, JULY TO SEPTEMBER 1984

N. A. Bond, Jr. and M. L. Moore Sep. 1984 145 p

(AD-A147282) Avail: NTIS HC A07/MF A01 CSCL 05/2

The automatic recognition of handprinted Chinese-Japanese Kanji, thermal mechanical processing of steel plates, narrow gap welding in Japan, and ocean characteristics are among the topics discussed. Biological membrane research in Japan, GaAs materials technology in Japan, bulk crystals, radiophysics in Australia, and current activities in Japanese psychology are also considered. GRA

N85-17931# National Bureau of Standards, Washington, D.C.

JOURNAL OF RESEARCH OF THE NATIONAL BUREAU OF STANDARDS, VOLUME 89, NUMBER 1, JANUARY-FEBRUARY, 1984

Feb. 1984 149 p refs

(PB84-235530) Avail: NTIS HC A07/MF A01; also avail. SOD as SN003-003-72085-2 CSCL 14B

Contents: (1) surface roughness studies with DALLAS-detector array for laser light angular scattering; (2) microstructural characterization of ceramic materials by small angle neutron scattering techniques; (3) characterization of creep damage in metals using small angle neutron scattering; (4) impedance of a coil in the vicinity of a crack; (5) theory of acoustic emission from phase transformations; (6) reconstructing internal temperature distributions from ultrasonic time-of-flight tomography and dimensional resonance measurements; and (7) acoustic emission-establishing the fundamentals. GRA

SUBJECT INDEX

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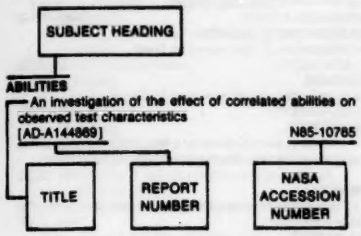

The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA ,translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this joùrnal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7051).

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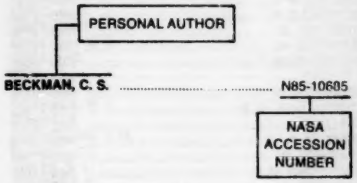

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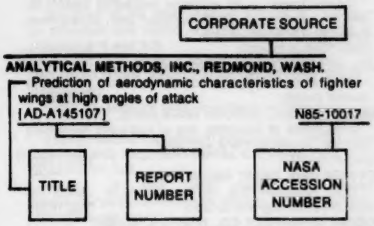

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BYURAKAN OBSERVATORY (USSR).
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CALIFORNIA INST. OF TECH., PASADENA.
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Spectral modeling of a potential vorticity equation for a barotropic flow on a beta-plane
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Computational methods for nonlinear dynamics problems in solid and structural mechanics
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EAGLE ENGINEERING, INC., HOUSTON, TEX.
Impact of lunar and planetary missions on the space station
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Training guide for scientific and engineering trainees 1984
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National airspace review enhancement plan, revision 3 N85-16852
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EUROPEAN SPACE AGENCY, PARIS (FRANCE).
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Preliminary evaluation of an improved flammability test method for aircraft materials
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FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
FAA (Federal Aviation Administration) statistical handbook of aviation, calendar year 1983
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Middle atmosphere program. Handbook for MAP. Volume 13: Ground-based techniques
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USSR report: Transportation
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On the importance of light hydrocarbons in multiphase atmospheric systems
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Prediction of cruciform all-movable control characteristics at transonic speeds
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Effects of high energy radiation on the mechanical properties of epoxy-graphite fiber reinforced composites
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Estimation of the rate of electron transfers between 2 contacting polymer surfaces
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NORTH CAROLINA UNIV., CHARLOTTE.
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Electronic properties of intercalated graphite and amorphous metals
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Catalytic ignition and combustion of lean mixtures
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NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT, KJELLER.
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[NASA-CR-175273] N85-17323

OBSERVATOIRE DE PARIS-MEUDON (FRANCE).
Active phenomena in the pre-main sequence star AB AUR N85-17765
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OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, TOULOUSE (FRANCE).
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Space environment simulation to test satellite thermal control coatings. Volume 2: Annexes 2, 3, 4
[ESA-CR(P)-1870-VOL-3] N85-17014

OFFICE OF NAVAL RESEARCH, ARLINGTON, VA.
SAR internal wave signature experiment N85-17253

OFFICE OF NAVAL RESEARCH LIASON OFFICE, FAR EAST, APO, SAN FRANCISCO, CALIF.
ONR (Office of Naval Research) Far East Scientific Bulletin, volume 9, number 3, July to September 1984
[AD-A147282] N85-17930

OFFICE OF TECHNOLOGY ASSESSMENT, WASHINGTON, D.C.
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OHIO STATE UNIV., COLUMBUS.
Adaptive antenna arrays for weak interfering signals
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PACIFIC MISSILE TEST CENTER, POINT MUGU, CALIF.
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POLITECNICO DI MILANO (ITALY).
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Advanced OTV engines and issues N85-17000

PRESTON POLYTECHNIC (ENGLAND).
The analysis of kinematic restraint and freedom using point contacts
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PRINCETON UNIV., N. J.
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Mesozoic ophiolitic olistostromes and Cenozoic imbricate thrust faulting in the northern California coast ranges: Geology of the Mysterious Valley area, Napa County N85-17445

PRINS MAURITS LAB. TNO, RIJSWIJK (NETHERLANDS).
The heat sensitivity of solid propellants N85-17043

PROFESSIONAL STAFF ASSOCIATION OF LOS ANGELES COUNTY/-UNIV. OF SOUTHERN CALIFORNIA MEDICAL CENTER, LOS ANGELES.
Bibliography of venomous and poisonous marine animals and their toxins
[AD-A148409] N85-17514

PROPELLANTS, EXPLOSIVES AND ROCKET MOTOR ESTABLISHMENT, WALTHAM ABBEY (ENGLAND).
Sensitiveness and explosiveness assessment at Perme Waltham Abbey N85-17029
Crack growth in propellants N85-17034
Hazard assessment of a hypothetical large rocket motor N85-17042

PROTEON ASSOCIATES, INC., WALTHAM, MASS.
Recommended improvements for second generation 121.5/243 MHz ELT's
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PURDUE UNIV., LAFAYETTE, IND.
Time series analysis of closed-loop pilot vehicle dynamics N85-16876
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[AD-A147614] N85-17646
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[AD-A148306] N85-17656

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RACAL AVIONICS LTD., NEW MALDEN (ENGLAND).
Integrated control and display systems for helicopter battlefield mission management N85-16805

RADIO RESEARCH LABS., TOKYO (JAPAN).
Remote sensing of rice fields and sea pollution by SIR-B N85-17222

RANGE COMMANDERS COUNCIL, WHITE SANDS MISSILE RANGE, N. MEX.
Guidelines for atmospheric measurements in support of electro-optical systems testing
[AD-A148090] N85-17474

RASOR ASSOCIATES, INC., SUNNYVALE, CALIF.
Close-spaced high temperature Knudsen flow
[AD-A148477] N85-17424

REGIS COLL., WESTON, MASS.
Artificial ionospheric disturbances caused by powerful radio waves
[AD-A148077] N85-17473
Ionospheric and magnetospheric modifications caused by VLF waves
[AD-A148210] N85-17475

RENSSELAER POLYTECHNIC INST., TROY, N. Y.
Combustion kinetics of metal oxide and halide radicals
[AD-A148521] N85-17076
Structure of solids surfaces in wear situations
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A moving finite element method for time dependent partial differential equations with error estimation and refinement
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A local refinement finite element method for time dependent partial differential equations
[AD-A147943] N85-17620
Far infrared observations of molecular clouds in the outer galaxy N85-17869

RESEARCH INST. OF NATIONAL DEFENCE, LINKOEPING (SWEDEN).
Extraction of structural information from radar signals
[FOA-C-30370-E1] N85-17292
Advanced technology for hydrographic mapping
[FOA-C-30371-E1] N85-17418
The radiation temperature of a cloud of particles
[FOA-C-30367-E4] N85-17497

RESEARCH INST. OF NATIONAL DEFENCE, STOCKHOLM (SWEDEN).
Decision making in stressful conditions: A model based on the coping perspective
[FOA-C-55064-H3] N85-17738

RESEARCH TRIANGLE INST., RESEARCH TRIANGLE PARK, N.C.
Hardware/software codesign for maintainable systems N85-16753

REYNOLDS, SMITH AND HILLS, JACKSONVILLE, FLA.
Mechanical features of the shuttle rotating service structure N85-16967

ROCHESTER UNIV., N. Y.
Phase-dissipative mechanisms for laser-induced surface desorption-dissociation processes
[AD-A147961] N85-17065

ROCKETDYNE, CANOGA PARK, CALIF.
Advanced OTV engine concepts N85-17001

ROCKWELL INTERNATIONAL CORP., COCOA BEACH, FLA.
Overview od STS ground operations/orbiter turnaround STS-1 through STS-7 N85-16926
Transition to the space shuttle operations era N85-16930
Managing computer-controlled operations N85-16934

ROCKWELL INTERNATIONAL CORP., DOWNEY, CALIF.
Other challenges in the development of the orbiter environmental control hardware N85-16924
Space shuttle elevon seal panel mechanism N85-16961
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ROCKWELL INTERNATIONAL CORP., LOS ANGELES, CALIF.
Joined wing transonic design and test validation
[AD-A148355] N85-16834

ROCKWELL INTERNATIONAL CORP., RICHARDSON, TEX.
Orbital transfer vehicle propulsion issues N85-17009

ROHDE AND SCHWARTZ, MUNICH (WEST GERMANY).
Development, production and testing of central control and display unit for helicopters
[BMFT-FB-W-84-039] N85-16871

ROLLS-ROYCE LTD., DERBY (ENGLAND).
A comparison of measured and predicted unsteady pressure on a fan blade in unstalled supersonic flutter
[PNR-90223] N85-16839
The aircraft engine of the future
[PNR-90226] N85-16875
Rolls-Royce experience with thermal barrier coatings
[PNR-90222] N85-17152

ROLLS-ROYCE LTD., LONDON (ENGLAND).
Flexible manufacturing system for the production of aircraft parts
[BLL-PNR-90237-(899.3153)] N85-17159

ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N.Y.
The effects of soil moisture on bistatic clutter power
[AD-A147636] N85-17261
MC68CRX cross-assembler users manual
[AD-A148031] N85-17584
Formation of a limiting composition in the preparation of ternary 3-5 semiconductors by the VPE (Vapor Phase Epitaxy) Hydride technique
[AD-A147639] N85-17713

ROME UNIV. (ITALY).
Helicopter active control with rotor blades relaxation N85-16819
Lidar systems for aerosol studies: An outline N85-17457
An inverse Compton model of the X-ray emission in Seyfert galaxies N85-17827

ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH (ENGLAND).
Investigations into the effects of scale and compressibility on lift and drag in the RAE 5m pressurized low-speed wind tunnel N85-16773
A discussion of coning errors exhibited by inertial navigation systems
[RAE-TM-RAD-NAV-243] N85-16854
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[RAE-TM-SPACE-327] N85-16870
Individual geopotential coefficients of order 15 and 30, from resonant satellite orbits
[RAE-TR-84021] N85-16985
Polymer electrolytes: An investigation of some poly (N-propylaziridine)/lithium salt compositions
[RAE-TR-84036] N85-17130
The investigation of selected oceanographic applications of spaceborne synthetic-aperture radar N85-17233

ROYAL INST. OF TECH., STOCKHOLM (SWEDEN).
Papers of the 15th International Society for Photogrammetry and Remote Sensing (ISPRS) Congress
[TRITA-FMI-9] N85-17406
Mathematical aspects of digital terrain information; Report from International Society for Photogrammetry and Remote Sensing (ISPRS) working group 3:3, 1980 - 1984 N85-17407
A comparative test of photogrammetrically sampled digital elevation models N85-17408
Multimodels increase accuracy: Summary of an experiment N85-17409
Hierarchical data structures and algorithms for digital stereoscopical mensuration N85-17410
An efficient algorithm for the computation of the inverse in bundle adjustment systems N85-17411
Digital elevation model computation using fast Poisson solutions N85-17412
Sequential data processing for photogrammetric acquisition of digital elevation models N85-17413

ROYAL MARINES, LONDON (ENGLAND).
Aims and requirements of NATO group AC/310 N85-17026

ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
Development of guidance forecasts at the Royal Netherlands Metorological Institute (KNMI). Part 1: General information
[KNMI-TR-54-PT-1] N85-17499
Development of guidance forecasts at the Royal Netherlands Meteorological Institute (KNMI). Part 2: Extreme wind speed at IJmuiden
[KNMI-TR-54-PT-2] N85-17500

ROYAL SIGNALS AND RADAR ESTABLISHMENT, MALVERN (ENGLAND).
Air traffic management concepts for the UK in the 1990's: A review of recent RSRE work
[AD-A147850] N85-16853
A FORTRAN plotting package for graphic VDUs
[AD-A148489] N85-17577
Exposure modelling of particle beam lithography
[AD-A147849] N85-17678

ROYAL SOCIETY, LONDON (ENGLAND).
United Kingdom report on space research N85-17752

RUHR UNIV., BOCHUM (WEST GERMANY).
Continuous transition from star burst galaxies to Seyfert galaxies N85-17798
Spatially resolved optical spectroscopy of the radio jet of the X-ray galaxy NGC 2110 N85-17804

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N. J.
Soil formation on tertiary landsurfaces of the New Jersey coastal plain N85-17441
A 2-dimensional second order closure model of the upper atmosphere N85-17450

S

SACLANT ASW RESEARCH CENTER, LA SPEZIA (ITALY).
An efficient numerical solution technique for wave propagation in horizontally stratified ocean environments
[AD-A148537] N85-17502
Deep water mass circulation in the Western Alboran Basin: Measurements in July and September 1980 (Alboran I experiment)
[AD-A148566] N85-17504

SAN DIEGO STATE UNIV., CALIF.
History of photometric precision N85-17893
The atmospheric extinction problem N85-17901
Filter and passband problems N85-17910

SASKATCHEWAN UNIV., SASKATOON.
Partial reflection D-region electron densities N85-17461

SCIENCE APPLICATIONS, INC., CHATSWORTH, CALIF.
Combustion in high speed air flows
[AD-A148371] N85-17070

SCIENCE APPLICATIONS, INC., MCLEAN, VA.
Analytical and numerical modeling of gyrotrons
[AD-A148100] N85-17300
SAI (Science Applications, Inc.) Interim Scattering Model/Ice (SISM/ICE)
[AD-A148596] N85-17638

SCIENCE APPLICATIONS, INC., SAN DIEGO, CALIF.
Measurement of oxygen contamination in titanium alloy ingots by fast neutron activation analysis
[AD-P004133] N85-17108

SCIENTIFIC MEASUREMENT SYSTEMS, INC., AUSTIN, TEX.
Neutron activation analysis of titanium with oxygen contamination
[AD-P004134] N85-17109

SHEFFIELD UNIV. (ENGLAND).
Improved stability and performance bounds using approximate models
[RR-260] N85-17606
The practical identification of systems with nonlinearities
[RR-264] N85-17607
Approximate models in multivariable process control: An inverse Nyquist array and robust tuning regulator interpretation
[RR-261] N85-17663
Design of mismatched Smith predictors using plant step data
[RR-263] N85-17664

SHOCK AND VIBRATION INFORMATION CENTER (DEFENSE), WASHINGTON, D. C.
The Shock and Vibration Digest, volume 16, no. 11
[AD-A148466] N85-17382

SIGNATRON, INC., LEXINGTON, MASS.
EMC (Electromagnetic compatibility) spec criteria in Volterra systems
[AD-A147659] N85-17263

SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS.
Investigation of dynamic noise affecting geodynamics information in a tethered subsatellite
[NASA-CR-174292] N85-17405
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[NASA-CR-174291] N85-17918
The calculation of theoretical chromospheric models and the interpretation of solar spectra from rockets and spacecraft
[NASA-CR-174289] N85-17922

SOCIETE DE FABRICATION D'INSTRUMENTS DE MESURE, MASSY (FRANCE).
A digital piloting system for the combat helicopter N85-16806

SOFTWARE ARCHITECTURE AND ENGINEERING, INC., ARLINGTON, VA.
A unified model for performance and reliability of Fault-Tolerant/Multi-Mode systems
[AD-A148789] N85-17601

SOUTH AFRICAN ASTRONOMICAL OBSERVATORY, SUTHERLAND.
Time series photometry with a CCD camera N85-17906

SOUTHAMPTON UNIV. (ENGLAND).
Modelling circulation control by blowing N85-16778

SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.
Effects of oxygen-contamination-induced microstructural changes on the reverberation of ultrasound in Ti-6211 alloys
[AD-P004124] N85-17099
Evaluation of interstitial gas contamination in titanium alloys using induced magnetic field analysis
[AD-P004130] N85-17105

SPACE TELESCOPE SCIENCE INST., BALTIMORE, MD.
Ultraviolet spectral morphology of O-type stellar winds N85-17762
Synchrotron emission from chaotic stellar winds N85-17774
On the unique capabilities of the Hubble space telescope for studies of ROSAT deep-survey X-ray sources N85-17846

SPAR AEROSPACE LTD., TORONTO (ONTARIO).
An overview of the space remote manipulator system N85-16964

SPECTRA RESEARCH SYSTEMS, INC., HUNTSVILLE, ALA.
Assessment of the operating characteristics of the SSME LOX turbopump pump-end bearing
[NASA-CR-171287] N85-17362

SPECTRON DEVELOPMENT LABS., INC., COSTA MESA, CALIF.
Development of holographic particle field data reduction by Fourier analysis
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SPRINGBORN LABS., INC., ENFIELD, CONN.
Prototype wash water renovation system integration with government-furnished wash fixture
[NASA-CR-171829] N85-17547
SRI INTERNATIONAL CORP., MENLO PARK, CALIF.
Collision-induced dipole moments
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Spatiotemporal characteristics of visual localization
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[AD-A148213] N85-17744
STANDARD ELEKTRIK LORENZ A.G., STUTTGART (WEST GERMANY).
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Ultrahigh carbon steel
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Structural studies of amorphous Mo-Ge alloys using synchrotron radiation
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Methods and applications of time series analysis. Part 2: Linear stochastic models
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Convergence of quasi-stationary to stationary distributions for stochastically monotone Markov processes
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Energy release in solar flares
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STATE UNIV. OF NEW YORK, STONY BROOK.
Numerical solution of elastodynamic problems in fracture mechanics N85-17385
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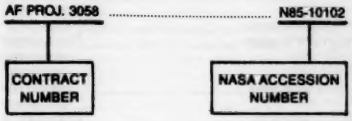

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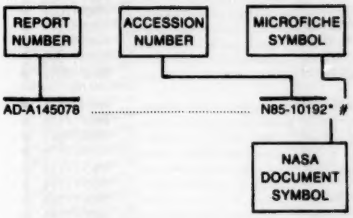

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